CENTRAL ELECTRONICS 20-A

MULTIPHASE EXCITER

MODEL 20 A

INSTRUCTION MANUAL

108 MX

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CENTRAL ELECTRONICS, INC.

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M66

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CONDENSED OPERATING INSTRUCTIONS FOR MULTIPHASE EXCITER MODEL 20A

Connect an antenna or a linear amplifier to the 52 ohm RF output. Set bandswitch to the band desired and the VFO-Xtal switch to the proper position. Turn CARRIER knob fully clockwise. Turn OPERATION selector to MANUAL and tune the MIXER AND AMPLIFIER for maximum output as shown on the RF INDICATOR, an oscilloscope or an antenna meter.

TO OPERATE SINGLE SIDEBAND

Set the MODULATION selector to one of the sideband positions (SB1 or SB2). Turn the OPERATION selector to MANUAL. With the CARRIER knob set at "O" adjust the CARRIER NULL controls A and B for minimum RF indication with the INDICATOR switch in CARRIER NULL position. Now return the INDICATOR switch to SET MAX LEVEL. Adjust the SPEECH LEVEL control between 9 and 12 o'clock, depending upon microphone gain. Talk into the microphone and you're on SSB!

TO OPERATE AM

Place the MODULATION selector in the AM position. Leave the CARRIER NULL knobs in the balanced-out condition. Advance the CARRIER knob until maximum output is obtained. Then reduce the CARRIER level to one half of the maximum value on the scope or to one half the maximum antenna current. Adjust the SPEECH LEVEL until the modulation peaks just reach the maximum output value on the scope. Too little or too much carrier will make the AM transmission sound distorted.

TO OPERATE PM (Narrow band phase modulation)

Turn the MODULATION selector to PM position. Leave the CARRIER NULL knobs on the balanced-out condition. Advance the CARRIER knob to nearly full output. Adjust the SPEECH LEVEL control so that the modulation peaks do not exceed the carrier.

TO OPERATE CW

Turn the MODULATION selector to CW. Place the OPERATION selector on MANUAL. Advance the CARRIER control to nearly full output. Plug key into jack on front panel.

TO USE THE VOICE CONTROL CIRCUIT (VOX)

Connect the receiver speaker to the Exciter as shown in the circuit diagram. The resistor across 1 and 2 on the rear terminal strip should be about two to three times the speaker voice coil impedance and rated at twice the power output. The extra contacts on 8, 9 and 10 may be used to operate an antenna relay, additional receiver silencing circuits, etc. With the OPERATION selector in VOX position talk into the microphone and adjust the VOX sensitivity control on the rear of the chassis for proper operation.

When the OPERATION selector is in the CALIBRATE position the CAL LEVEL control will vary the output of the Exciter for frequency "spotting".

INDICATOR SWITCH

In the CARRIER NULL position the speech circuit is disabled and the RF INDICATOR operates at maximum sensitivity. The CARRIER control should always be at "O" while balancing out the carrier with CARRIER NULL knobs A and B. In the SET MAX LEVEL position, the RF INDICATOR sensitivity can be adjusted by the IND LEVEL control.

RF INDICATOR

The 6E5 RF INDICATOR shows the peak RF voltage output of the Exciter. It can be used for peaking the Mixer and Amplifier tuning controls and also to determine the proper speech level while operating SSB. To determine the maximum undistorted SSB output of the Exciter or linear amplifier, advance the CARRIER control until no further increase in output is observed. Now set the IND LEVEL control to just close the eye. Return the CARRIER CONTROL to "O" and adjust the SPEECH LEVEL until the voice peaks reach about 80% of the full carrier value.

EXTERNAL BLOCKING BIAS

In the standby position, -100 volts DC appears at terminal 7 on the rear terminal strip. If a bias supply is used for a linear amplifier the positive should be returned to this terminal of the Exciter. All positive components in the bias supply must be "floating" from ground, and connected only to the positive lead.

When zero bias tubes are used, the amplifier grid return lead should be by-passed and then connected to terminal 7. A secure ground connection should be made between the Exciter, linear amplifier, linear amplifier power supply and the bias supply.

If an antenna relay with auxiliary contacts is used, these auxiliary "make" contacts can be used to key the blocking bias by connecting them to #6 and #7 on the rear terminal strip. Proper keying sequence is required so that the antenna circuit makes before the blocking bias is removed.

When the auxiliary contacts on an antenna relay are not used to key the transmitter, the jumper should remain between terminals 6 and 7 on the strip.

RESISTIVE LOADING OR "SWAMPING"

600Ω

When driving a linear amplifier, some resistive loading should be used at the Exciter or at the amplifier grid circuit. Non-inductive resistors should be used and may be connected to the two screw terminal output strip on the rear chassis. The amount of resistive loading required will depend upon the type of tubes used in the amplifier. Pentodes, tetrodes and zero bias triodes require only a small amount, while medium and low mu tubes will require heavier swamping for low distortion.

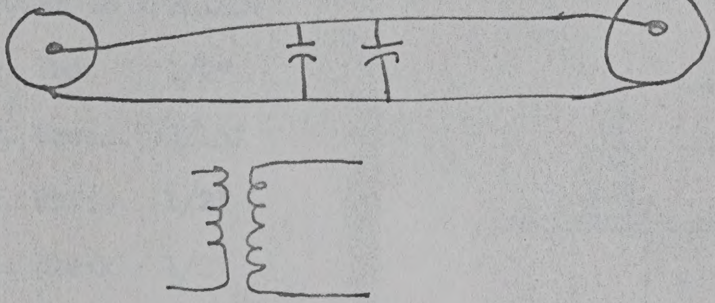
A-6-

If the exciter is lightly loaded, there is a possibility of the system going into self-oscillation. Resistive loading is not necessary when the Exciter is coupled to a constant load, such as a 50 to 70 ohm antenna.

MATCHING THE GRID CIRCUIT OF A LINEAR AMPLIFIER STAGE

In order to obtain a maximum transfer of RF from the Exciter to grid circuit of a linear amplifier stage, it is often necessary to tune the reactance out of the link on the grid coil. This is especially true when Multiband tuners are used. A suitable unit for this purpose is a two gang, or three gang midget type of broadcast capacitor, about 400 mmfd. per section, with all the stators connected in parallel. This should be connected to either series tune, or parallel tune the PA grid link coil, and can usually be inserted right at the PA coaxial cable connector. It is sometimes beneficial to experiment with the number of turns on the grid coil link to obtain maximum grid current.

Tuning the reactance out the plate coil link in the Linear Amplifier in the same manner will assist in obtaining the heavy loading required for this type of service.



PRELIMINARY ALIGNMENT INSTRUCTIONS.

THE FOLLOWING IS RECOMMENDED FOR UNITS CONSTRUCTED FROM KITS.

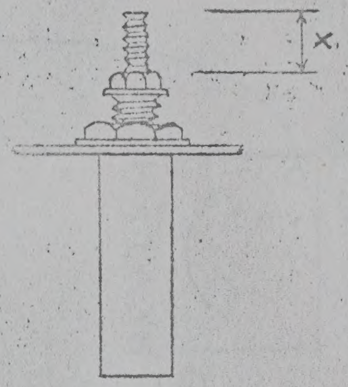
Check for "B" shorts with an ohmmeter before power is applied.

Before plate voltage is applied, the 6AG7 grid bias should be checked. This should be done by removing the 5U4G rectifier tube. With the relay in the normal position, the reading at Pin #4 of the 6AG7 should be - 100V DC plus or minus 10% measured with a VTVM. When the relay is operated by hand, there should be approxiamately - 11V DC at this point. After the 5U4G is inserted, the operating bias should be - 10.5V DC obtained from the voltage divider R47 and R48.

Insert the 5U4G rectifier and apply power. Check "B" voltages in accordance with the chart on the circuit diagram, with the OPERATION switch on MANUAL.

Preliminary rough alignment of the slug-tuned coils: If a grid dipper is available the coils should be aligned to the frequencies indicated on the Alignment Data Chart (Fig. B) If no dipper is available they should be set as follows BEFORE POWER IS APPLIED:

No.L1.	Red	1/2"	
No.L2.	Green	3/16"	
No.L3.	White	1/2"	
No.L4.	Black	1/2"	
No.L5.	Blue	1/2"	
No.L6.	Orange	5/16"	
No.L7.	Yellow	5/16"	
No.L8.	Blue	3/8"	(Not used on Model 10B)



The Audio Balance controls should be set in approximately mid-position.

During alignment, a slight amount of tension should be kept on the adjusting screws by proper adjustment of the locking nut to prevent erratic operation.

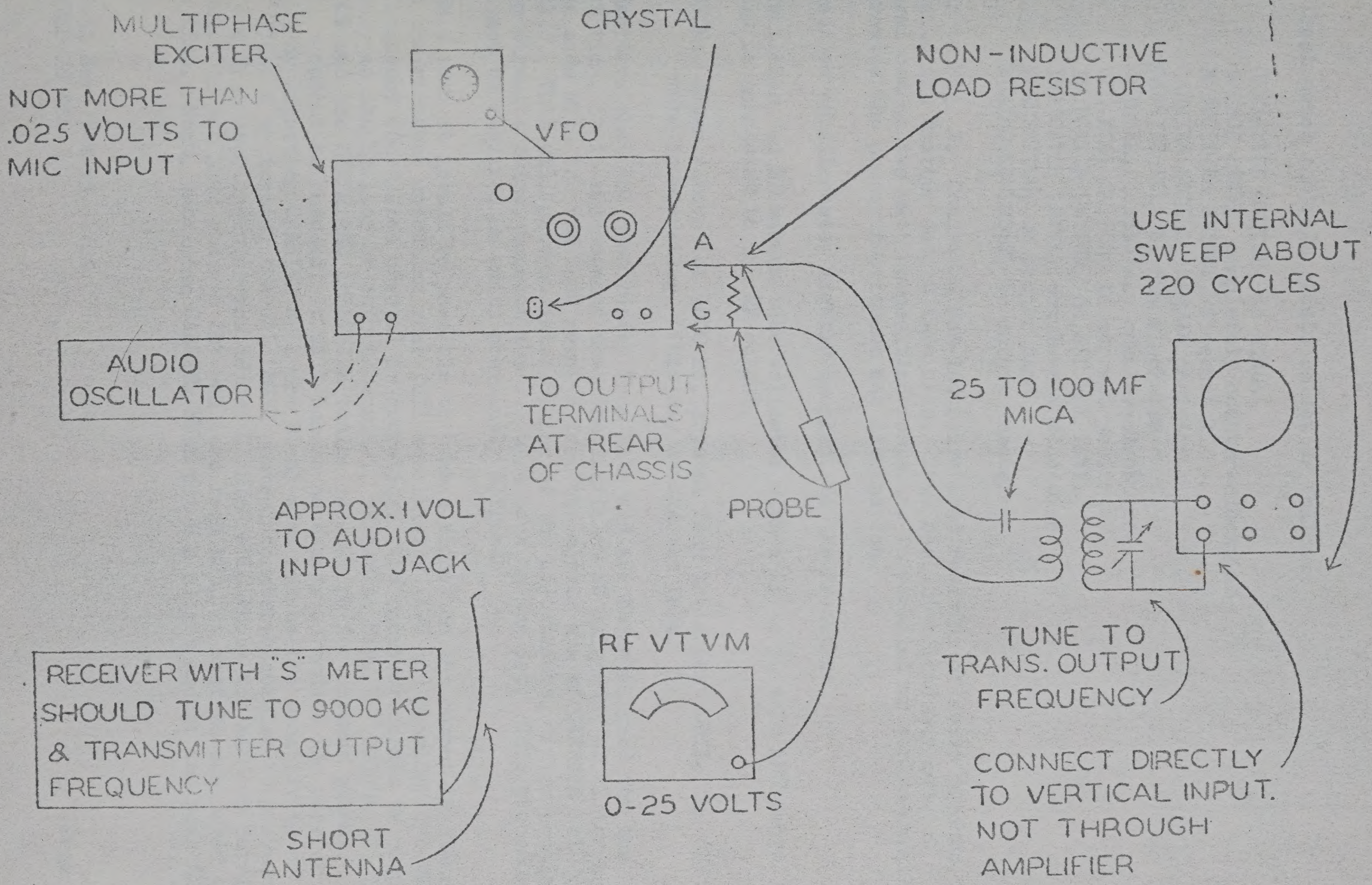

MULTIPHASE EXCITER
NOT MORE THAN .025 VOLTS TO MIC INPUT
CRYSTAL
VFO
NON-INDUCTIVE LOAD RESISTOR
USE INTERNAL SWEEP ABOUT 220 CYCLES
A
G
AUDIO OSCILLATOR
TO OUTPUT TERMINALS AT REAR OF CHASSIS
25 TO 100 MF MICA
PROBE
APPROX. 1 VOLT TO AUDIO INPUT JACK
RF VTVM
0-25 VOLTS
TUNE TO TRANS. OUTPUT FREQUENCY
RECEIVER WITH "S" METER SHOULD TUNE TO 9000 KC & TRANSMITTER OUTPUT FREQUENCY
CONNECT DIRECTLY TO VERTICAL INPUT. NOT THROUGH AMPLIFIER
SHORT ANTENNA

FIG A

20A GENERAL ALIGNMENT PROCEDURE

The front panel controls should be set as follows:

OPERATION SWITCH, in MANUAL
SPEECH LEVEL, completely counter-clockwise
MODULATION SWITCH, Sideband 1
CARRIER NULL A, middle position
CARRIER NULL B, 80% clockwise
CARRIER, completely counter-clockwise
VFO-XTAL SWITCH, in correct position
INDICATOR SWITCH, on SET MAX LEVEL
INDICATOR LEVEL, completely clockwise
BANDSWITCH, to proper band
TUNING CONTROLS, to output frequency

Refer to Fig. A. Connect a non-inductive load resistor of about 50 ohms, 20 watts to the Exciter output terminals. This resistive load may consist of several one or two watt composition resistors in parallel or series-parallel to provide the proper resistance and dissipation.

Connect an oscilloscope, lightly coupled, to the RF output.

If available, an RF vacuum tube voltmeter with a 25 to 50 volt RMS range should be connected to the RF output.

CAUTION: Never remove the 9000 kc. crystal from the socket while the 6U8 tube is operating. This may damage the tube.

In Exciters that are constructed from kits and are being aligned for the first time, it is recommended that the initial 9 MC alignment of L1 through L5 be made with the red lead removed from the center arm of CARRIER NULL pot A (R23). This will prevent interlocking of the adjustments. After peaking these circuits twice, connect the red wire back to the pot. This procedure will not be required on units previously aligned.

At this time it should be possible to hear a signal on the output frequency with the receiver operating near full sensitivity (AVC on) provided the VFO or frequency conversion crystal is operating. The receiver should be coupled lightly to the Exciter RF output terminal. Refer to Fig. B. Adjust L2, L3, L4, L5 and the MIXER AND AMPLIFIER tuning capacitors for maximum output. As maximum output is reached, it will become necessary to reduce the carrier output by adjusting CARRIER NULL pot B and also reduce the sensitivity of the RF INDICATOR by turning the CAL LEVEL control counter-clockwise to prevent the eye from overlapping. Now adjust CARRIER NULL knobs for minimum carrier output. If you have removed the red lead from R23, it must be connected at this time. Next, unbalance CARRIER NULL pot B a slight amount and peak L2

through L5 again. Now adjust both CARRIER NULL controls for minimum output. Minimum output will not necessarily occur at the center of the rotation due to stray capacities, etc. [illegible] wise [illegible] if [illegible]

When L2 (green) is mounted approximately 3/4" (center to center) away from L1 (red), the RF voltage from the arm of each CARRIER NULL pot to ground will be equal when the carrier is balanced out. If desired, this may be checked with an RF vacuum tube voltmeter.

ADJUSTMENT OF L6 and L7

When operating on the 20 meter band, these trap circuits reduce the radiation of the third harmonic generated in the mixer by the heterodyning crystal or VFO operating in the range of 5 to 5.3 MC. With the bandswitch set to 20 meters, the SPEECH LEVEL turned off, carrier balanced out, and OPERATION switch in the MANUAL position, RF output will be found when the Mixer and Amplifier tuning controls are set at about 15.5 MC. Adjust both these traps for minimum 15,450 kc. output while using a crystal at approximately 5,150 kc. If no crystal in this range is available, one at approximately 3,850 kc. will supply sufficient 4th harmonic output for this purpose. If you do not intend to operate 14 MC crystal controlled, it will not be necessary to adjust L7 (yellow). When only VFO operation is contemplated in this band, L6 (the orange coil on top of the bandswitching assembly) should be tuned for minimum 15,450 kc. output with the VFO set at 5,150 kc.

Although the 3rd harmonic output may be only a few percent of the total, it can be amplified by the Mixer and Amplifier stages and result in considerable output. With the trap circuits properly aligned, the power output at 15,450 kc. will be less than 10% of that normally obtained at 14 MC., even though the Mixer and Amplifier are peaked at 15,450 kc. When the Mixer and Amplifier are peaked at 14 MC. the other signal will be down in excess of 50 db. in the Exciter. The addition of a properly tuned linear amplifier stage will increase the rejection of the 15 MC. signal to at least 70 to 80 db. down.

The VFO output should be advanced to the point where additional coupling will not increase the Exciter output. Over-injection to the Mixer can cause unnecessary spurious radiation.

ADJUSTMENT OF 5 MC. TRAP L8

Blue coil near the right edge of the chassis. Set the bandswitch to 80 meters. With either a 5 MC. crystal plugged into the socket on the front panel or 5 MC. VFO insertion, adjust the Mixer and Amplifier tuning controls for maximum 5 MC. output. This will occur slightly lower in frequency than the 7 MC. dial calibration. Adjust L8 for minimum output.

ADJUSTMENT OF C81, C82, C83, C84: These four trimmers appear on a strip at the right of the bandswitching assembly, just below the 12BH7 tube. They tune the cathode coils on 10, 15, 20 and 40 meters, respectively. The 10 meter trimmer is the one closest to the chassis; the second one is 15 meters, etc. They should be peaked for maximum output in the center of their band with a small amount of CARRIER inserted.

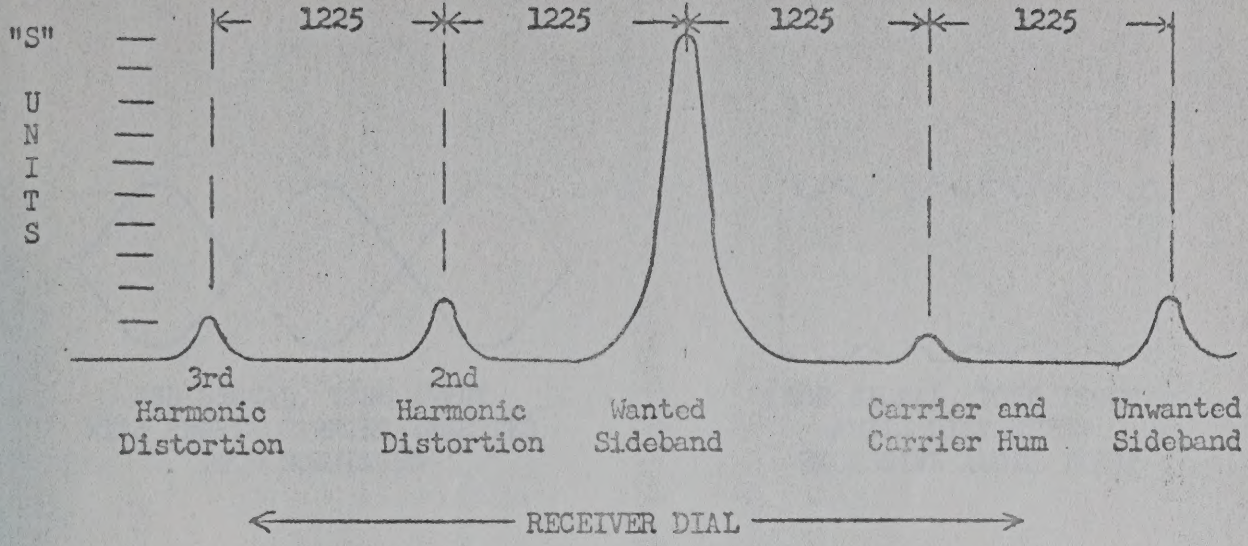
SIDEBAND SUPRESSION ADJUSTMENT: Before proceeding with the Single Sideband adjustments, it is recommended that the operator familiarize himself with the illustrations of the oscilloscope patterns shown in this manual. The ultimate objective in the single sideband alignment is to obtain a pattern containing a minimum amount of ripple when a pure sine wave is applied to the microphone input. These adjustments should preferably be made at less than full output, to prevent amplifier overloading, which might "wipe off" the small modulation ripple.

A low distortion audio oscillator (less than 1%) set to approx. 1,225 cycles, with an output level between .005 and .05 volts should be connected to the microphone jack. CAUTION: If a voltage in excess of .075 is applied to the Mic. input the speech amplifier will overload and it will be impossible to adjust the exciter properly.

Adjust both CARRIER NULL pots for minimum carrier output. Advance the SPEECH LEVEL control until about half of maximum output is obtained on the oscilloscope. At this point a fair amount of ripple will be observed on the output wave. Adjust the Audio Balance controls for minimum ripple. Now switch from Sideband 1 to Sideband 2 and observe the ripple in each. If the amount of ripple is not equal, vary the adjustment slightly on L2 until the displays are identical in either sideband position. However, each time L2 is tuned, it will be necessary to rebalance both carrier null controls for minimum. It will also be necessary to readjust the Audio Balance controls again.

It is possible to make these sideband suppression adjustments using a receiver in place of an oscilloscope. Turn the AVC on, the BFO off, and remove the antenna to prevent receiver overload. Now tune in the signal. Minimum modulation heard in the loudspeaker corresponds to minimum modulation of the R.F. envelope. Adjust as described in the previous paragraph.

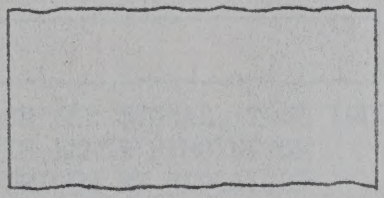
After the alignment has been completed, an analysis of the emitted wave may be made if the receiver has a sharp crystal filter and a calibrated "S" meter. The following illustration is an example of the "S" meter levels as the receiver dial is tuned through the signal with a 1225 cycle tone input to the exciter.



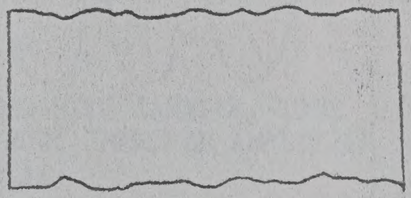
It is possible to obtain an almost ripple-free pattern in one sideband at the expense of degradation of the other. Under this condition the suppression of the better sideband will be about 45 db., while the other is only 35 db. down. The object is to have them both equal, approximately 40 db. down.

If a deep modulation ripple is noticed on both sideband positions (with carrier balanced out), one side of the audio phase shift circuit is probably operating improperly. Check the Audio Balance controls adjustment, the 12AT7 (B) modulator tube, sideband switching circuit, or the phase shift network.

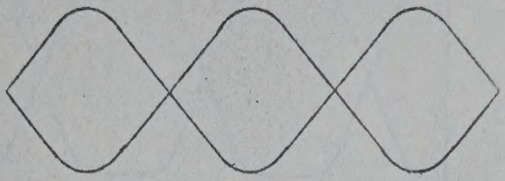
After the alignment has been completed, be sure to tighten the #6 lock-nuts on the iron core slugs.



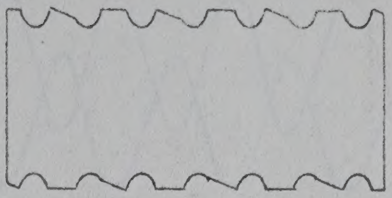
Good SSB Signal
Pure Tone Input



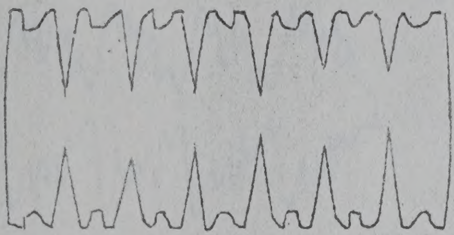
SSB Signal, Tone Input
1. Carrier leakage
2. Improper RF phasing (L2)
3. Improper AF balance
(R13-15A)
4. Balanced Mod detuned (L3)
5. Poor sideband rejection



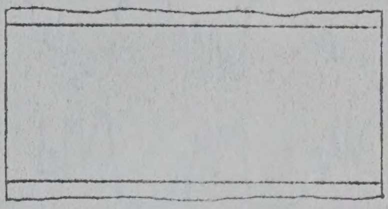
SSB SIGNAL, TONE INPUT
WITH PROPER CARRIER INSERTED
100% MODULATED



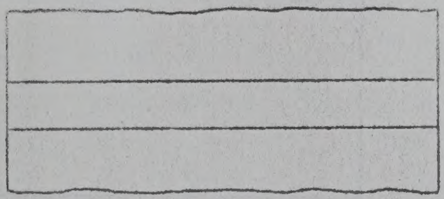
SSB SIGNAL, TONE INPUT
AUDIO DISTORTION
EXCESSIVE AUDIO INPUT



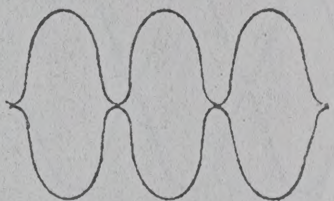
SSB SIGNAL, TONE INPUT
INSUFFICIENT 9000 kc. XTAL
OSCILLATOR OUTPUT



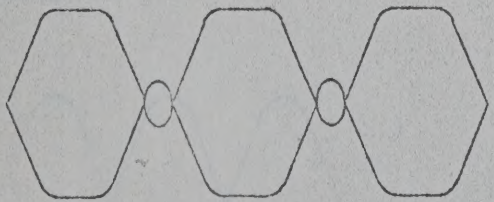
GOOD SSB SIGNAL, TONE
INPUT WITH SMALL PERCENT OF SPURIOUS RADIATION (RF)



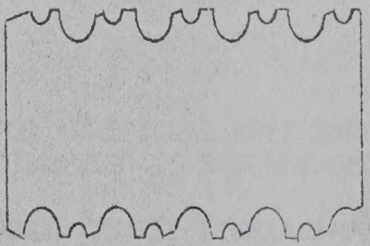
GOOD SSB SIGNAL, TONE INPUT
WITH LARGE PERCENT OF
SPURIOUS RF RADIATION



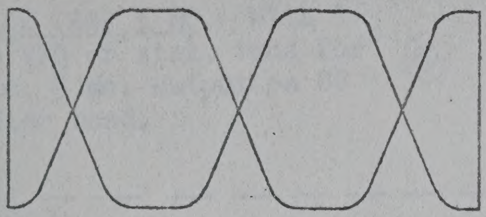
SSB WITH CARRIER, TONE
INPUT IMPROPER AMPLIFIER
BIAS



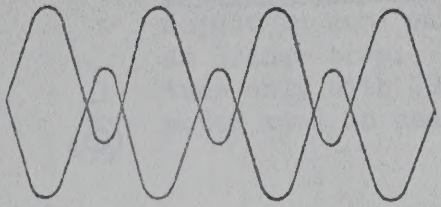
DOUBLE SIDEBAND WITH CARRIER
EXCESSIVE TONE MODULATION
WITH AUDIO PEAKS SQUARING OFF



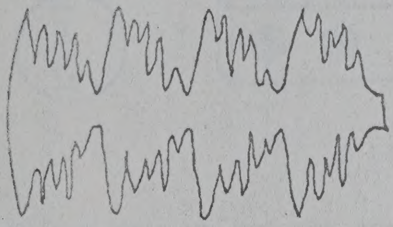
SSB SIGNAL, TONE INPUT
BALANCED MOD DETUNED (L3)



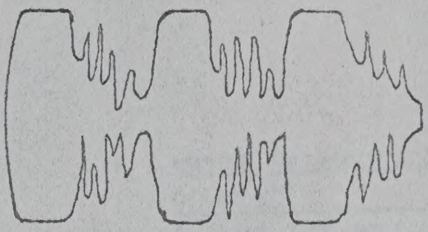
SSB WITH CARRIER, TONE INPUT
1. EXCESSIVE AUDIO
2. INSUFFICIENT ANT LOADING



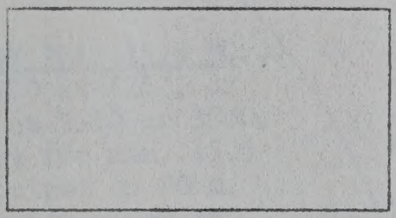
DSRC DOUBLE SIDEBAND REDUCED CARRIER OBTAINED BY REDUCING CARRIER LEVEL AND INCREASING AUDIO INPUT LEVEL



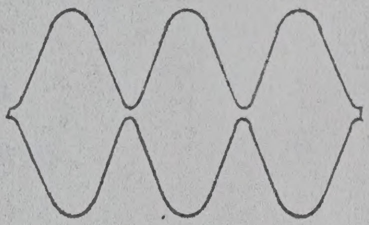
GOOD SSB SIGNAL
VOICE INPUT



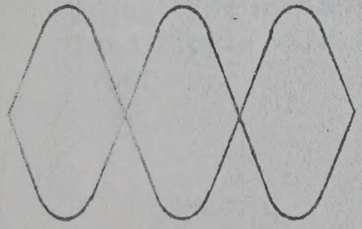
SSB SIGNAL, VOICE INPUT SQUARING AUDIO PEAKS EXCESSIVE SPEECH GAIN



SSB SIGNAL, TONE INPUT AMPLIFIER OVERLOADING DUE TO EXCESSIVE AF OR RF DRIVE NOTE THE LACK OF SMALL RIPPLE ON ENVELOPE



DOUBLE SIDEBAND AM WITH CARRIER 100% MODULATED



TWO TONE LINEARITY TEST OBTAINED WITH SINGLE TONE INPUT, WITH CARRIER BALANCED OUT ON AM

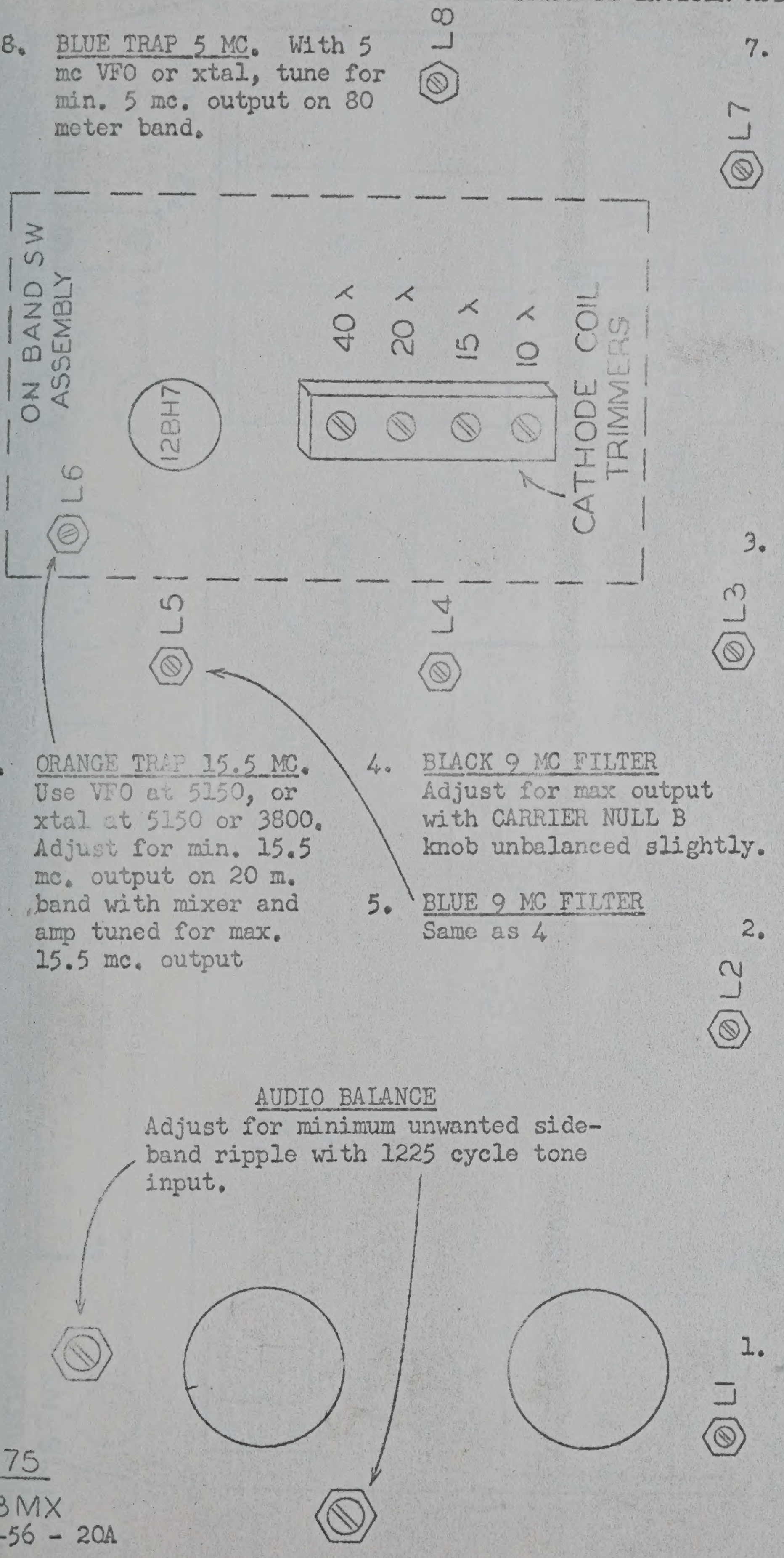
FOR ADDITIONAL REFERENCE THE FOLLOWING IS RECOMMENDED:

SUGAR COATED LINEAR AMPLIFIER THEORY - OCT. '51 QST

HOW TO TEST AND ALIGN A LINEAR AMPLIFIER - MAY '52 QST

FIGURE B

ALIGNMENT DATA FOR MULTIPHASE EXCITER MODEL 20A



8. BLUE TRAP 5 MC. With 5 mc VFO or xtal, tune for min. 5 mc. output on 80 meter band.

7. YELLOW TRAP 15.5 MC Adjust in same manner as Orange trap. Will tune only with 20 meter xtal in use.

3. WHITE BALANCED MOD. 9000 KC Adjust for max output with CARRIER NULL "B" knob unbalanced slightly.

6. ORANGE TRAP 15.5 MC. Use VFO at 5150, or xtal at 5150 or 3800. Adjust for min. 15.5 mc. output on 20 m. band with mixer and amp tuned for max. 15.5 mc. output

4. BLACK 9 MC FILTER Adjust for max output with CARRIER NULL B knob unbalanced slightly.

5. BLUE 9 MC FILTER Same as 4

2. GREEN 90° PHASE SHIFT 9000 KC. Peak for max. output with CARRIER NULL knob B unbalanced. Afterward, adjust for equal sideband suppression with 1225 cycle tone input.

AUDIO BALANCE
Adjust for minimum unwanted sideband ripple with 1225 cycle tone input.

1. RED XTAL OSC. 9000 KC Peak for maximum output with CARRIER NULL knob B unbalanced.

M75
108MX
6-5-56 - 20A

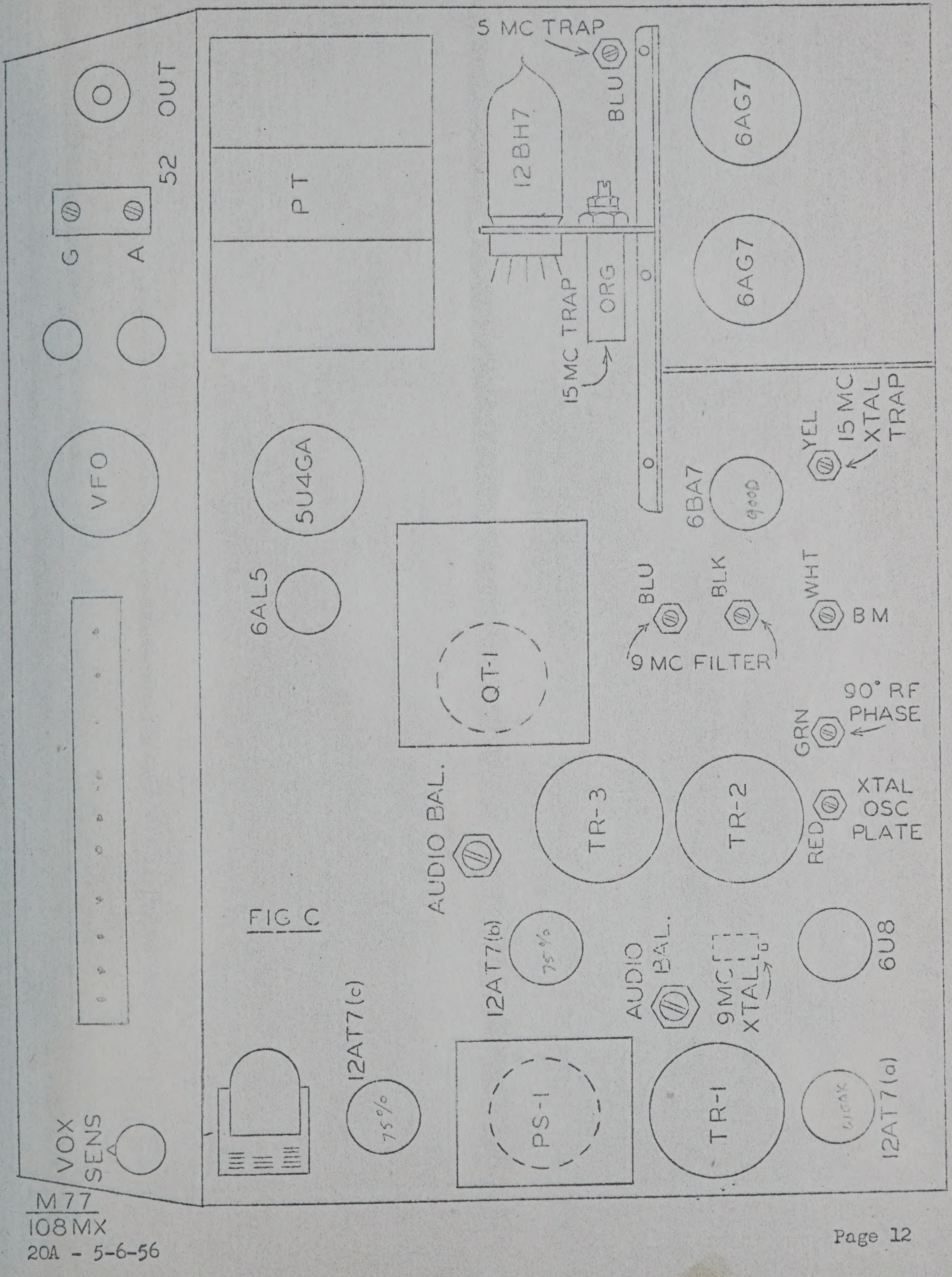
5 MC TRAP
BLU
12BH7
6AG7
6AG7
OUT
52
G
A
PT
ORG
15 MC TRAP
VFO
5U4GA
6BA7
good
YEL
15 MC XTAL TRAP
6AL5
QT-1
BLU
BLK
WHT
BM
9 MC FILTER
90° RF PHASE
GRN
XTAL OSC PLATE
RED
TR-3
TR-2
AUDIO BAL.
AUDIO BAL.
12AT7(b)
75%
9MC XTAL
6U8
12AT7(c)
75%
PS-1
TR-1
weak
12AT7(a)
VOX SENS

FIG C

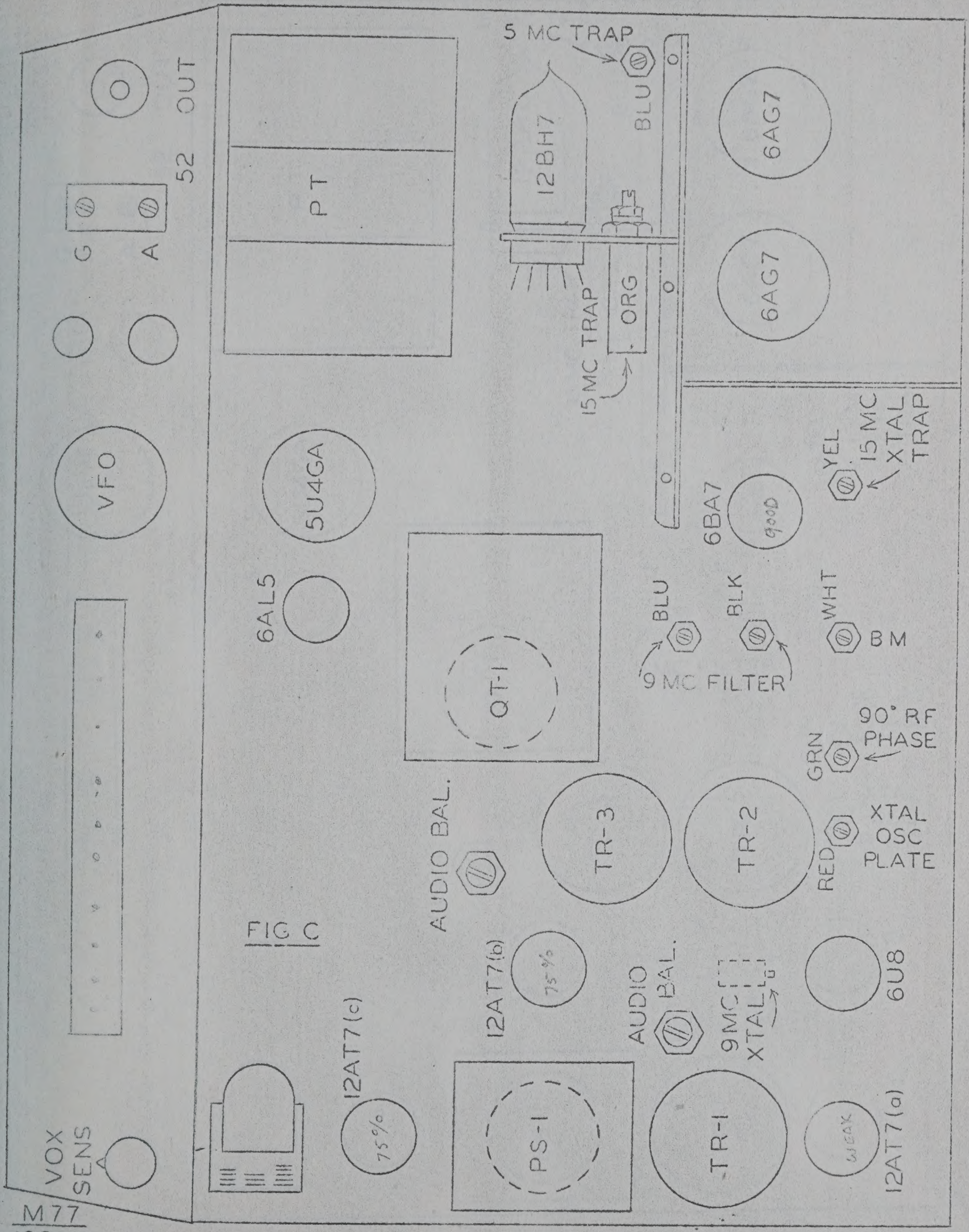

VOX SENS
VFO
G
A
52 OUT
PT
5U4GA
6AL5
12BH7
5 MC TRAP
BLU
ORG
15 MC TRAP
6AG7
6AG7
6BA7
good
YEL
15 MC XTAL TRAP
BLU
BLK
9 MC FILTER
WHT
B M
QT-1
GRN
90° RF PHASE
RED
XTAL OSC PLATE
TR-3
TR-2
AUDIO BAL.
12AT7(b)
75%
6U8
9 MC XTAL
AUDIO BAL.
PS-1
TR-1
12AT7(a)
6J6AX
12AT7(c)
75%

FIG C

M 77
108 MX

20A - 5-6-56

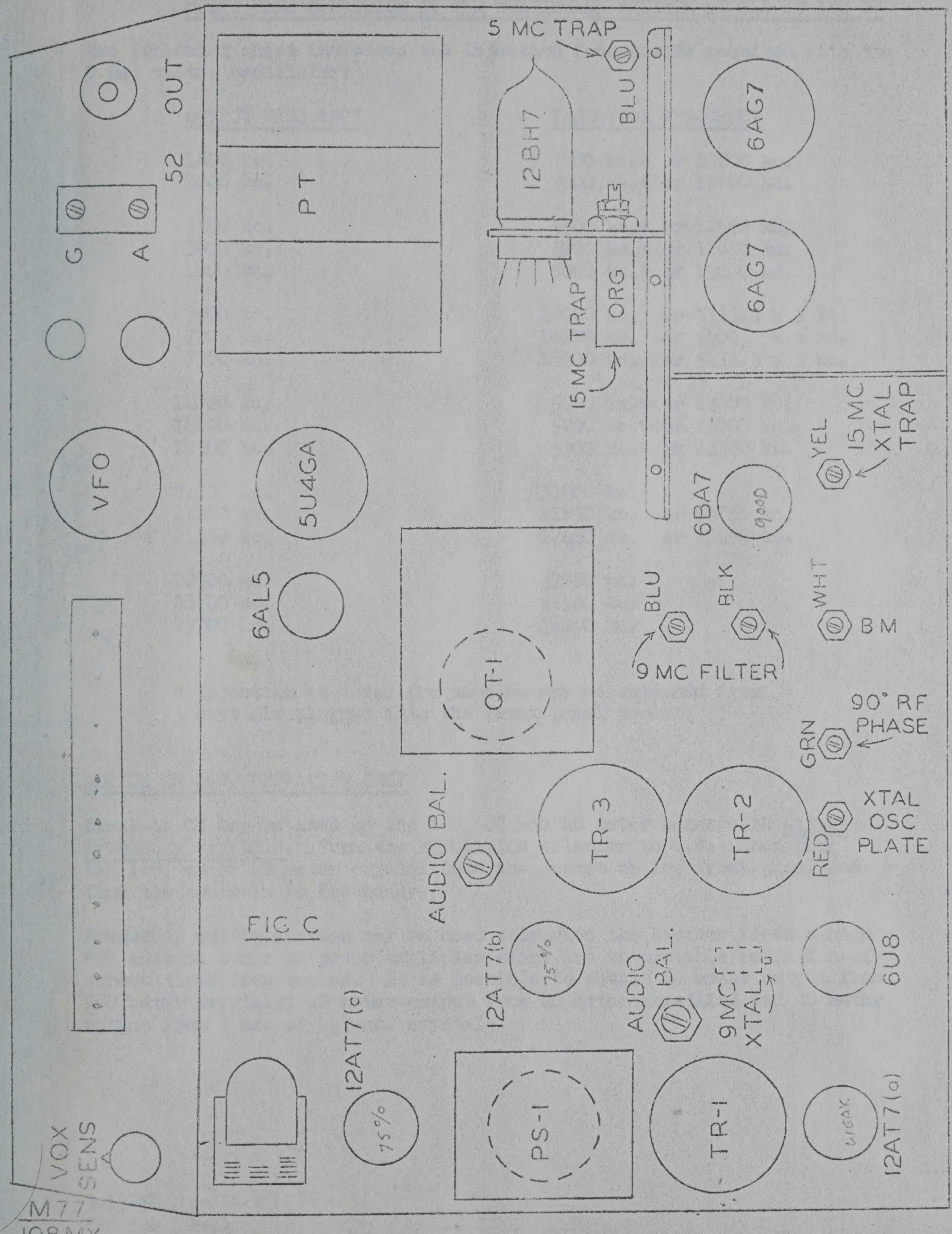


FIG C
5 MC TRAP
BLU
12BH7
ORG
15 MC TRAP
6AG7
6AG7
15 MC XTAL TRAP
YEL
6BA7
good
BLU
BLK
WHT
BM
9 MC FILTER
90° RF PHASE
GRN
XTAL OSC PLATE
RED
TR-2
TR-3
QT-1
AUDIO BAL.
6U8
9 MC XTAL
AUDIO BAL.
12AT7(b)
75%
TR-1
12AT7(a)
WEAK
PS-1
12AT7(c)
75%
VOX SENS
6AL5
5U4GA
VFO
PT
G
A
52
OUT

MULTI-BAND OPERATION OF THE MULTIPHASE EXCITER MODELS 10 AND 20

The following chart indicates the injection frequencies required with the 9 mc. master oscillator:

OUTPUT FREQUENCY	INJECTION FREQUENCY
1800 kc.	7200 kc.* or 10800 kc.
2000 kc.	7000 kc.* or 11000 kc.
3500 kc.	5500 kc.* or 12500 kc.
3800 kc.	5200 kc.* or 12800 kc.
4000 kc.	5000 kc.* or 13000 kc.
7000 kc.	16000 kc. or 5333.3 x 3 Kc. = 15999.9
7200 kc.	16200 kc. or 5400 x 3 kc. = 16200.
7300 kc.	16300 kc. or 5433.3 x 3 kc. = 16299.9
14000 kc.	5000 kc.* or 23000 kc.
14200 kc.	5200 kc.* or 23200 kc.
14300 kc.	5300 kc.* or 23300 kc.
21000 kc.	30000 kc.
21250 kc.	12250 kc. or 30250 kc.
21450 kc.	12450 kc. or 30450 kc.
28000 kc.	37000 kc.
28500 kc.	37500 kc.
29700 kc.	38700 kc.

38700
29700
9000 MC

29610
9000
20.610

20 610

* Injection at these frequencies may be obtained from crystals plugged into the front panel socket.

NOVICE OR C.W. OPERATION ONLY

Break-in CW may be used on the 160, 80 and 40 meter bands with direct frequency crystals. Turn the MODULATION selector to C.W. Then plug the 160, 80 or 40 meter crystal into the socket on the front panel and tune the controls to frequency.

Frequency multiplication may be used only when the Exciter feeds a high "Q" antenna tuner or power amplifier stage due to probable radiation of sub-multiple frequencies. It is possible to obtain 80 meter output from 160 meter crystals; 40 meter output from 80 meter crystals; and 20 meter output from 7 mc. or 4.7 mc. crystals.

I G

R 1000/30.000 cc3

3-17-54
VFO for 10-20
PRINTED IN USA

BASIC MODIFICATION OF THE BC-457, BC-458 or BC-459
AS A VFO FOR MODEL 10 or 20 MULTIPHASE EXCITER FOR 12 VOLT OPERATION

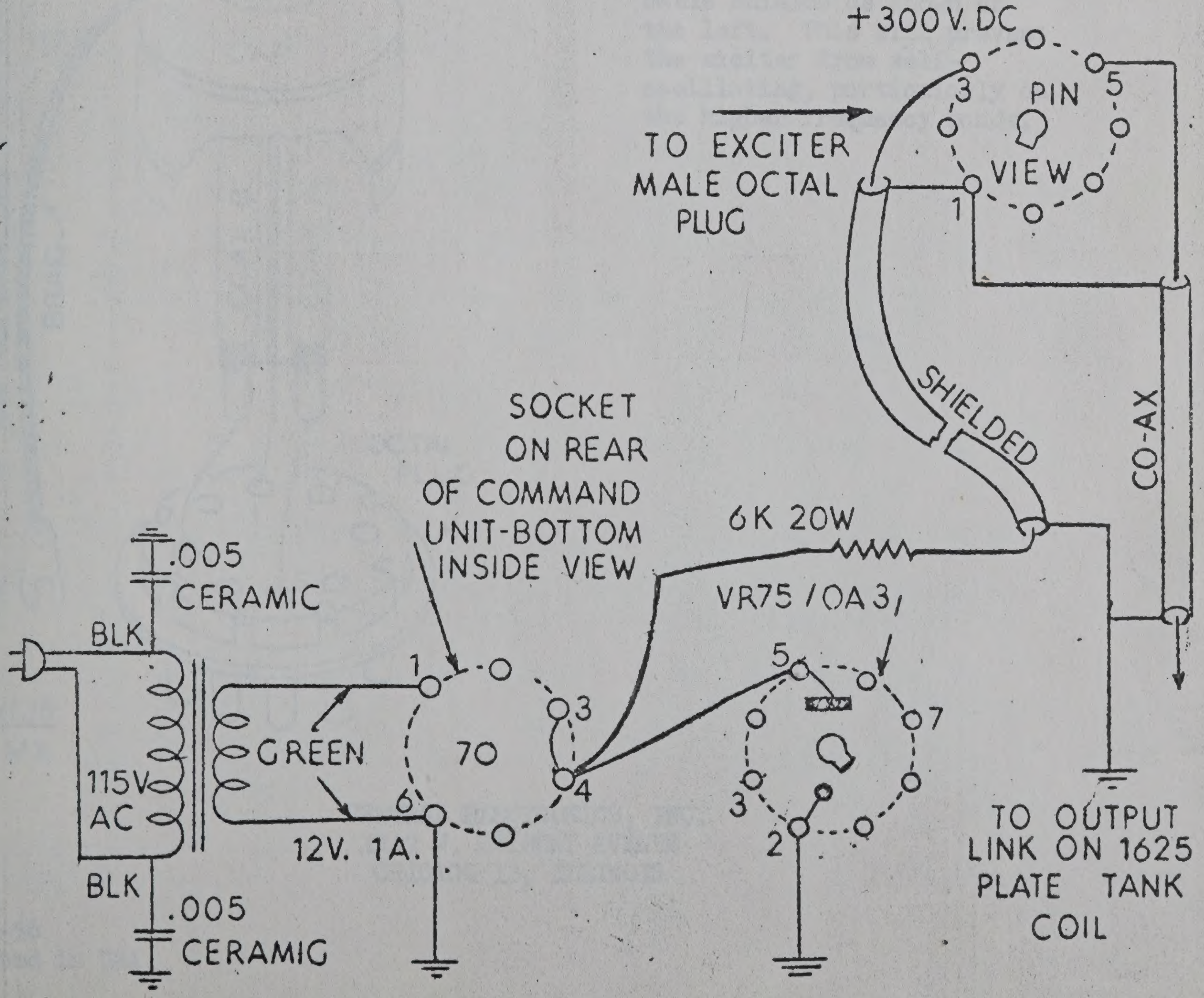
The contacts on the keying relay (beneath the chassis) should be closed by using jumpers or soldering the contacts together. This applies B plus to the oscillator and also grounds the cathode circuit on the 1625 stage. Remove the 1629 eye tube and also the 1625 located near the tuning shaft. Jumpers should be installed across the filament terminals of these unused sockets. Only one 1625 is necessary for proper operation.

The antenna loading coil and antenna relay are not necessary and can be removed. The co-ax cable to the Exciter can be attached directly to the output link of the 1625 final tank coil.

Plate voltage for the VFO is supplied from the Exciter through an octal socket on the rear.

The electrical connections for the external wiring are shown below.

Advance the antenna coupling adjustment on the VFO to the point where additional coupling will not increase the Exciter output. Over injection to the mixer will generate harmonics of the VFO frequency that can appear in the output as spurious radiation.


+300 V. DC
3
PIN
5
VIEW
1
TO EXCITER
MALE OCTAL
PLUG
SHIELDED
CO-AX
SOCKET
ON REAR
OF COMMAND
UNIT-BOTTOM
INSIDE VIEW
6K 20W
.005
CERAMIC
BLK
115V
AC
GREEN
12V. 1A.
1
3
70
4
6
VR75 / OA 3
5
7
3
2
BLK
.005
CERAMIC
TO OUTPUT
LINK ON 1625
PLATE TANK
COIL

458 VFO

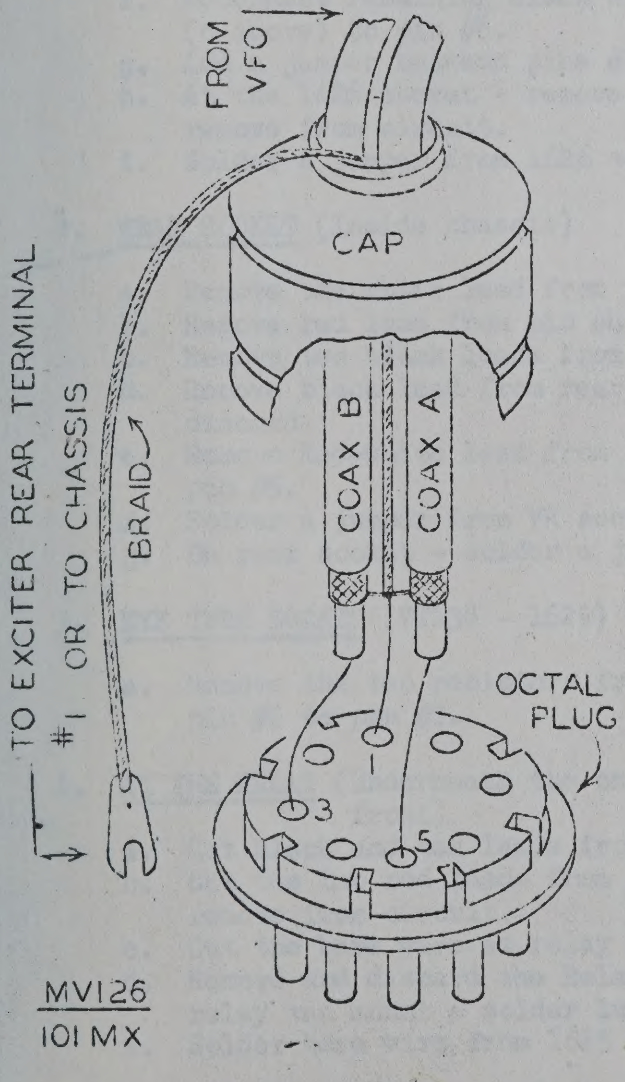
CHANGE NOTICE

In order to provide sufficient output when the 1625 is operating as a frequency tripler to 16 mc. (for 40 meter operation) the Voltage Regulator tube has been changed to a VR105. The dropping resistor for the Regulator Tube is now 4000 ohms.

If the 1625 grid bias resistor (located on terminals 6 and 7 on the VR tube socket) is increased to 100,000 ohms, additional reserve output will be obtained.

- - - - - - - - - - - - - -

* * * *


FROM VFO
CAP
COAX B
COAX A
BRAID
TO EXCITER REAR TERMINAL #1 OR TO CHASSIS
OCTAL PLUG
1
3
5
MV126
101MX

It is advisable to provide an additional low impedance ground path for the coaxial cable shields as shown on the left. This will prevent the exciter from self-oscillating, particularly on the higher frequency bands.

CENTRAL ELECTRONICS, INC.
1247 W. BELMONT AVENUE
CHICAGO 13, ILLINOIS

458K
5-11-56
Printed in USA

DETAILED CONVERSION INSTRUCTIONS
FOR
BC-457, BC-458, BC-459 WITH 12 VOLT OPERATION

This modification procedure allows the installation of a VR75 into the socket originally intended for the crystal calibrator and mounts the filament transformer and dropping resistor on the rear of the chassis.

> NOTE: Socket connections read clockwise from underneath chassis. Pin #7 on power socket (rear) is the center pin.

1. CRYSTAL SOCKET (Center octal socket rear of chassis)
   - a. Remove resistor between pin #3 and #8 - discard.
   - b. Remove black lead from pin #3 and take out of circuit.
   - c. Unsolder end of resistor from pin #5.
   - d. Unsolder two black leads from pin #5.
   - e. Disconnect black wire from pin #5 on rear socket and remove from circuit.
   - f. Reconnect remaining black wire (from pin #5) and end of resistor (c above) to pin #6.
   - g. Add a jumper between pins #1 and #2.
   - h. At the 1626 socket - remove red lead from pin #4 and tape end, or remove from circuit.
   - i. Solder a jumper from 1626 socket pin #4 to VR tube socket pin #5.

2. REAR SOCKET (Inside chassis)
   - a. Remove the white lead from pin #1 and discard.
   - b. Remove red lead from pin #4 and tape end.
   - c. Remove two black leads from pin #2 and discard.
   - d. Remove black lead from rear socket pin #6 and VR socket pin #7 and discard.
   - e. Remove Red-White lead from rear socket pin #7 and attach to VR socket pin #5.
   - f. Solder a jumper from VR socket pin #5 to rear socket pin #4.
   - g. On rear socket - solder a jumper from pin #3 to pin #4.

3. EYE TUBE SOCKET (VT138 - 1629)
   - a. Remove the two resistors from pin #8 and discard. Add a jumper from pin #2 to pin #7.

4. AT THE RELAY (Underneath the chassis, centered on right side viewing from front)
   - a. Cut black and tan leads from relay coil and remove from circuit.
   - b. Cut the two red leads from relay contacts and tape separately or remove from circuit.
   - c. Cut the bare wire at relay that goes to the 1625 socket pin #6.
   - d. Remove and discard the Relay. Enlarge the hole which formerly held relay and mount a solder lug with #6 hardware.
   - e. Solder bare wire from 1625 socket pin #6 to grounded solder lug.

3-17-54 VFO for 10-20
Printed in U.S.A.
Rev. 6-24-54

5. 1625

a. Add a jumper from pin #1 to pin #7 on the 1625 socket next to the tuning shaft.

6. FILAMENT TRANSFORMER 12 volts - 1 amp.

a. Mount on 1/2" spacers slightly above (horizontally) rear socket with secondary (green) leads down. Place two solder lugs under screw heads inside chassis.
b. Trim secondary leads to proper length and solder into rear socket pins #1 and #6 (from outside)
c. Drill hole for 3/8" grommet slightly below and to left of rear socket (viewed from rear).
d. Solder filament transformer primary leads to rear socket pins #2 and #5 outside of chassis.
e. Solder a .005 ceramic by-pass condenser from pin #2 on rear socket to ground lug.
f. Solder a .005 ceramic by-pass condenser from pin #5 on rear socket to ground lug.
g. Insert proper length of primary A.C. cord through grommet hole, tie a knot and solder leads to pins #2 and #5 of rear socket.

7. VR TUBE DROPPING RESISTOR 6000 ohm 20 watts

a. Mount a 6000 ohm 20 watt resistor on the back of the chassis slightly below and to the left of rear socket. (Resistor is mounted outside chassis for heat radiation).
b. From outside chassis, solder a jumper from rear socket pin #4 to low potential end of 6000 ohm 20 watt resistor.
c. Plate voltage is supplied from the Exciter through an octal plug and cable, as shown on page 2. Inner conductor is soldered to one lug of 6000 ohm 20 watt resistor.

Hi Z mic

Preamp. 12AT7 a

AF Driver 6U8/2

Driver tranformer

Voice amplifier 6AL5

" Rectifier 12AT7/2

AF. Modulator 12AT7 B

Mixer 6BA7

cathode follower - 12BH7

Power amp - 2.6AG7

Voice

RF Ind. 6E5

HV Rect - 5U4G

Ground

1-2 Rcvr output xformer -

3-4 Spkr

5 Ground

6-7 -100 dc on standby } action of relay
Ground on Xmit.

8-9-10 Spares -

10-20A CHANGE NOTICE

This is a summary of changes made during production of Multiphase Exciter Model 20A. Some of these changes are applicable to Model 10B and are noted accordingly. This information is presented in accordance with Central Electronics policy to keep its customers advised of improvements.

The first change occurred on 6-21-54 when an improved 9 MC master crystal oscillator was incorporated using a 6U8 in lieu of the 12BH7. This information will be sent upon request.

Later the 3 mmf capacitor (C72) on pin #7 of the grid of the 12BH7 cathode follower was removed. This increased the 10 meter drive.

In the latter part of 1954 a bad batch of 6AG7 tubes was received from GE. The tube would develop control grid to screen shorts and burn out the 180 ohm series screen resistors R57 and R58. These resistors were removed and jumpers installed so the fuse would blow, instead of a resistor, if a tube shorted. Production switched to RCA type 6AG7 tubes with complete success.

Some wiring changes to grounds, etc., are shown on the attached Change Notices, as well as information on the voice control relay.

It is recommended that the changes shown on Notice M151 be made to the 6BA7 mixer plate circuit in the 20A Bandswitch Assembly, if the changes outlined on Notice M149A are made. These changes will raise the 10 meter output to almost equal that obtained on the lower frequencies. The Exciter exhibits no tendency toward parasitics, even without load.

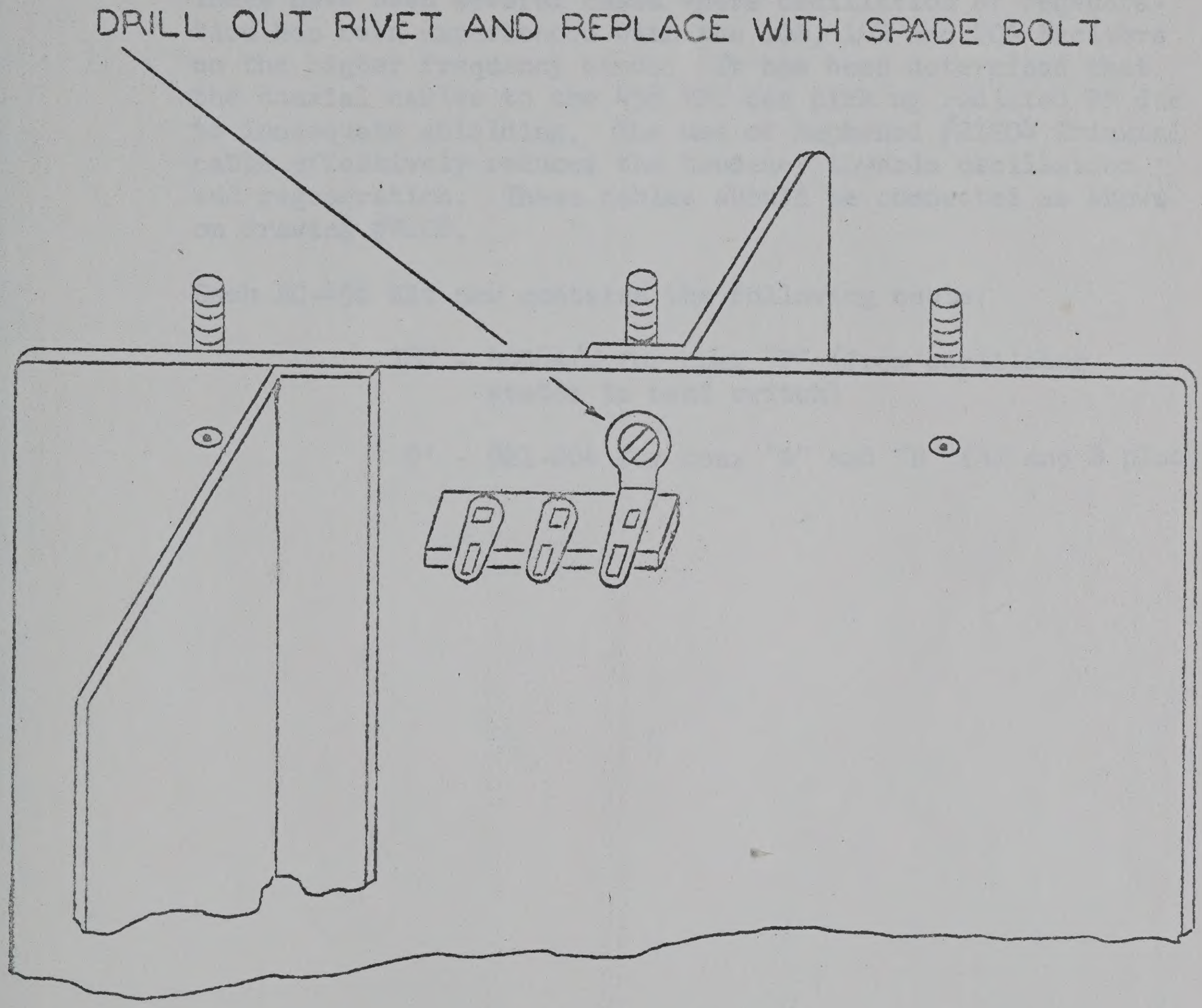
Change tuning slugs in the orange and yellow 15 MC trap coils from half brass and iron to all iron. The brass ring on the slug can generally be removed. This change increases 15 MC rejection.

Early production units had a 330 ohm resistor across the VFO input coax. This was removed to raise the mixer injection on 16 MC for improved 40 meter operation.

20A Change Notice
3-19-56

CENTRAL ELECTRONICS, INCORPORATED

20A CHANGE NOTICE



Tendency toward oscillation can be reduced on the older 20As by removing the rivet that holds the three lug terminal strip in the 6AG7 compartment, and installing a 6-32 spade bolt. A matching hole must be drilled in the perforated metal top shield. An additional 6-32 nut and lockwasher should be used to insure good contact with the cover. .

20A Change Notice
11-11-59
Printed in USA

BC 458 VFO CHANGE NOTICE

There have been several cases where oscillation or regeneration has been experienced with the 10A, 10B and 20A Exciters on the higher frequency bands. It has been determined that the coaxial cables to the 458 VFO can pick up radiated RF due to inadequate shielding. The use of Amphenol #21204 Triaxial cable effectively reduces the tendency towards oscillation and regeneration. These cables should be connected as shown on drawing #P208.

Each BC-458 Kit now contains the following cable:

18" - RG58A/U for coax "F" (from oscillator stator to band switch)

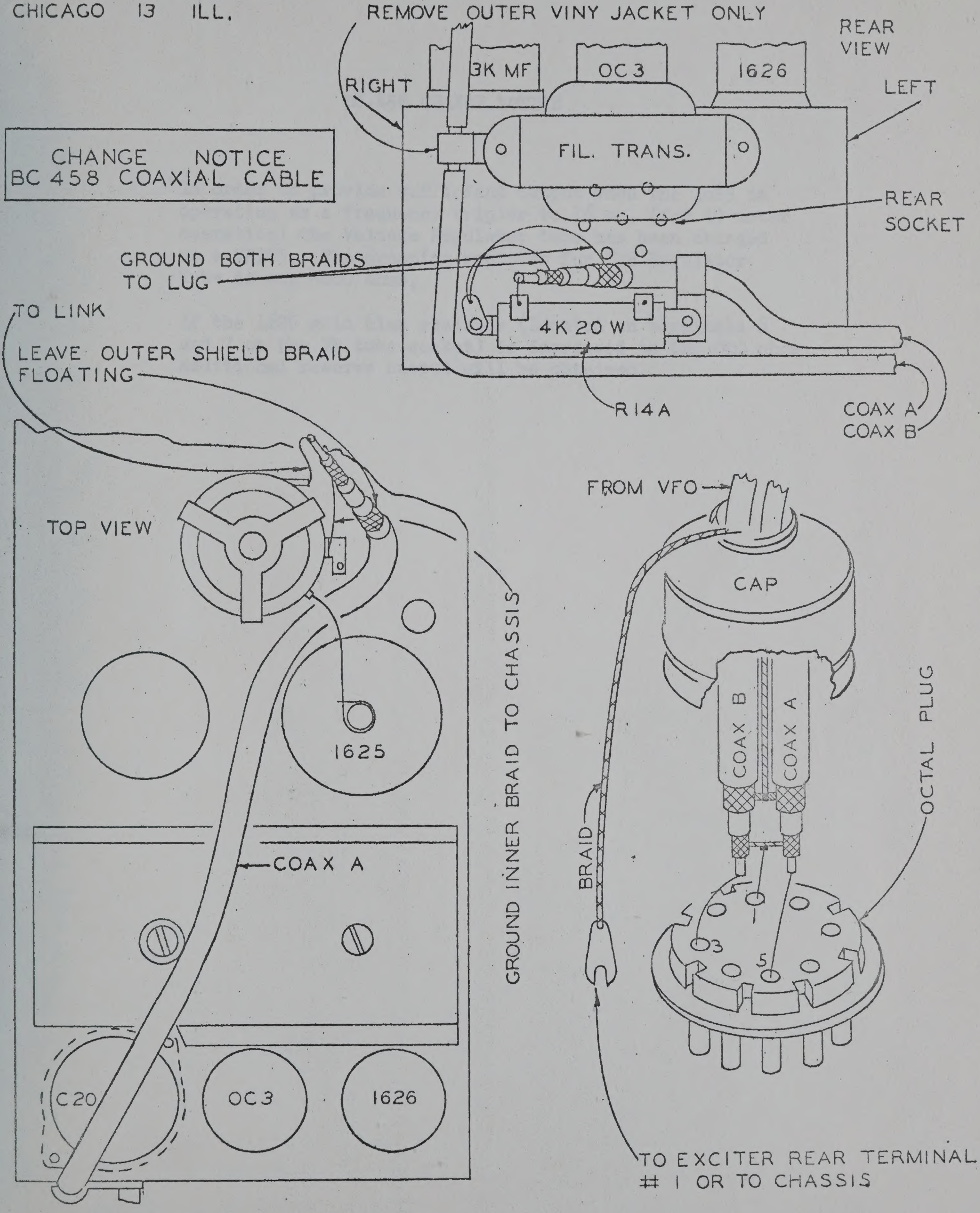
9' - #21-204 for coax "A" and "B" (RF and B plus)

VFO Change
4-29-59
Printed in USA

CENTRAL ELECTRONICS
1247 W. BELMONT AVE.
CHICAGO 13 ILL.

P208 4-13-59

CHANGE NOTICE
BC 458 COAXIAL CABLE


REMOVE OUTER VINY JACKET ONLY
REAR VIEW
RIGHT
LEFT
3K MF
OC3
1626
FIL. TRANS.
REAR SOCKET
GROUND BOTH BRAIDS TO LUG
4K 20 W
R14A
COAX A
COAX B
TO LINK
LEAVE OUTER SHIELD BRAID FLOATING
TOP VIEW
1625
COAX A
C20
OC3
1626
GROUND INNER BRAID TO CHASSIS
FROM VFO
CAP
COAX B
COAX A
OCTAL PLUG
BRAID
3
1
5
TO EXCITER REAR TERMINAL # 1 OR TO CHASSIS

PRINTED IN U.S.A.
BC-458 CHANGE NOTICE

BC-458 CHANGE NOTICE

In order to provide sufficient output when the 1625 is operating as a frequency tripler to 16 mc. (for 40 meter operation) the Voltage Regulator tube has been changed to a VR105. The dropping resistor for the Regulator Tube is now 4000 ohms.

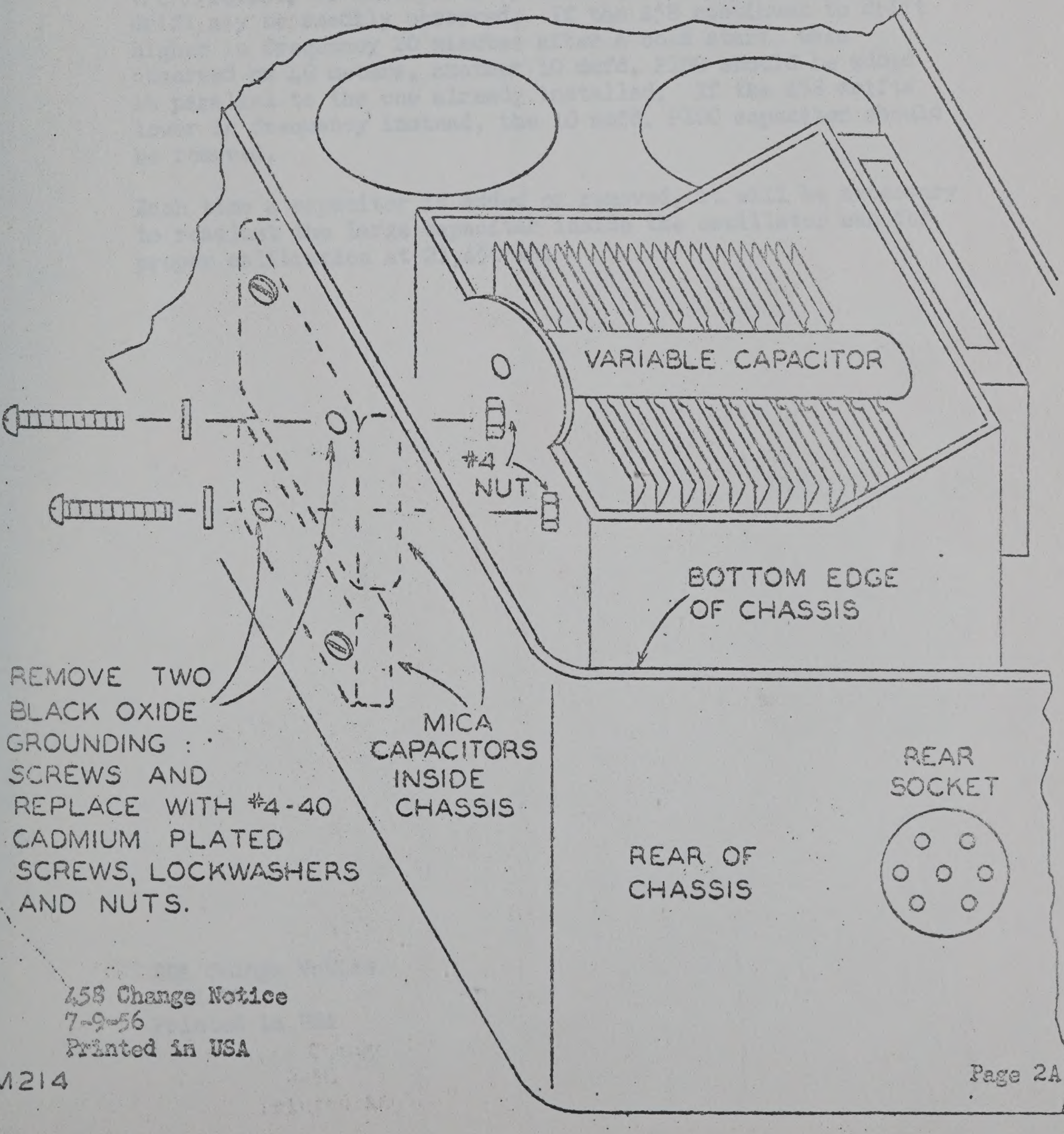
If the 1625 grid bias resistor (located on terminals 6 and 7 on the VR tube socket) is increased to 100,000 ohms, additional reserve output will be obtained.

VFO Change Notice
5-11-56
Printed in USA

458 CHANGE NOTICE

The black oxide screws sometimes make poor R.F. contact and must be replaced. Before installing coax F, remove two black oxide #3 nuts, screws and washers from the right side of chassis near rear, as shown. These two screws hold two mica capacitors and two ground lugs to the side of chassis. The two ground lugs should be cleaned, if necessary, to insure good contact. Two #4-40 x 5/8" screws, nuts and lockwashers are used to replace the #3 screws, as shown.

Place a lockwasher under head of screw; push through hole in side of chassis and capacitor. A #4 nut is used to hold lug and capacitor to inside of chassis. If your 458 is painted black wrinkle, it is advisable to scratch paint from around the two holes before adding #4 screws.



VARIABLE CAPACITOR
#4 NUT
BOTTOM EDGE OF CHASSIS
REMOVE TWO BLACK OXIDE GROUNDING SCREWS AND REPLACE WITH #4-40 CADMIUM PLATED SCREWS, LOCKWASHERS AND NUTS.
MICA CAPACITORS INSIDE CHASSIS
REAR SOCKET
REAR OF CHASSIS

458 Change Notice
7-9-56
Printed in USA

M214

TEMPERATURE COMPENSATION OF THE VFO

In order to achieve good stability in a reasonable period of time, the AVERAGE BC-458 requires a 10 mmfd. P100 temperature compensating capacitor, C26, inside the oscillator can. Be sure to remove the 3 mmfd. neg. 750 and change the 1626 grid capacitor to 180 mmf. zero temperature coefficient.

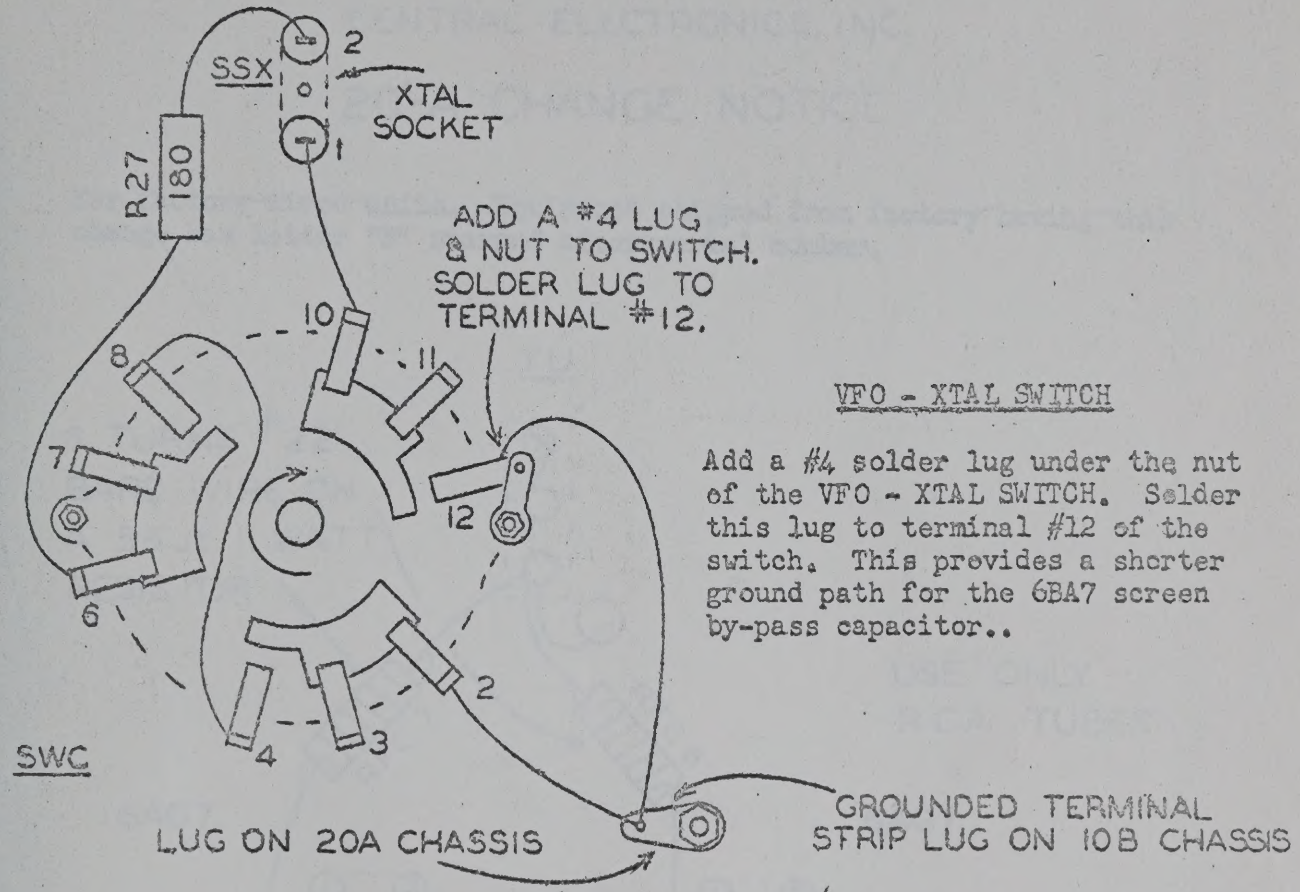
Occasionally some units may require no positive compensation at all, while others require 20 mmfd. P100.

It is recommended that all drift checks are made with the Exciter operating on the 40 meter band, where the fundamental VFO frequency is multiplied by three to 16 mc., so that any drift may be readily observed. If the 458 continues to drift higher in frequency 20 minutes after a cold start, when observed on 40 meters, another 10 mmfd. P100 should be added in parallel to the one already installed. If the 458 drifts lower in frequency instead, the 10 mmfd. P100 capacitor should be removed.

Each time a capacitor is added or removed, it will be necessary to readjust the large capacitor inside the oscillator can for proper calibration at 21,450 kc.

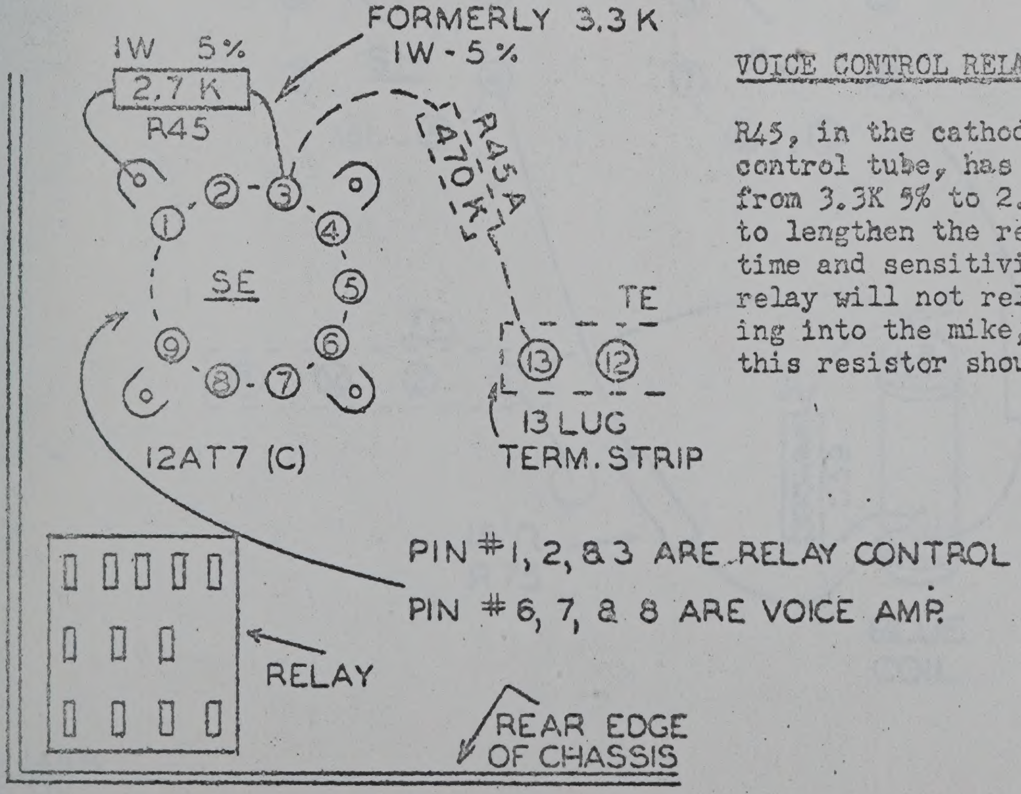
CENTRAL ELECTRONICS, INC.

10B — 20A CHANGES


SSX
2
XTAL SOCKET
1
R27
180
ADD A #4 LUG & NUT TO SWITCH. SOLDER LUG TO TERMINAL #12.
10
11
8
7
12
6
2
4
3
SWC
LUG ON 20A CHASSIS
GROUNDED TERMINAL STRIP LUG ON 10B CHASSIS

VFO - XTAL SWITCH

Add a #4 solder lug under the nut of the VFO - XTAL SWITCH. Solder this lug to terminal #12 of the switch. This provides a shorter ground path for the 6BA7 screen by-pass capacitor..


FORMERLY 3.3 K
1W - 5%
1W 5%
2.7 K
R45
R45A
470 K
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨
SE
TE
⑬ ⑫
13 LUG TERM. STRIP
12AT7 (C)
PIN #1, 2, & 3 ARE RELAY CONTROL
PIN #6, 7, & 8 ARE VOICE AMP.
RELAY
REAR EDGE OF CHASSIS

VOICE CONTROL RELAY CIRCUIT CHANGE

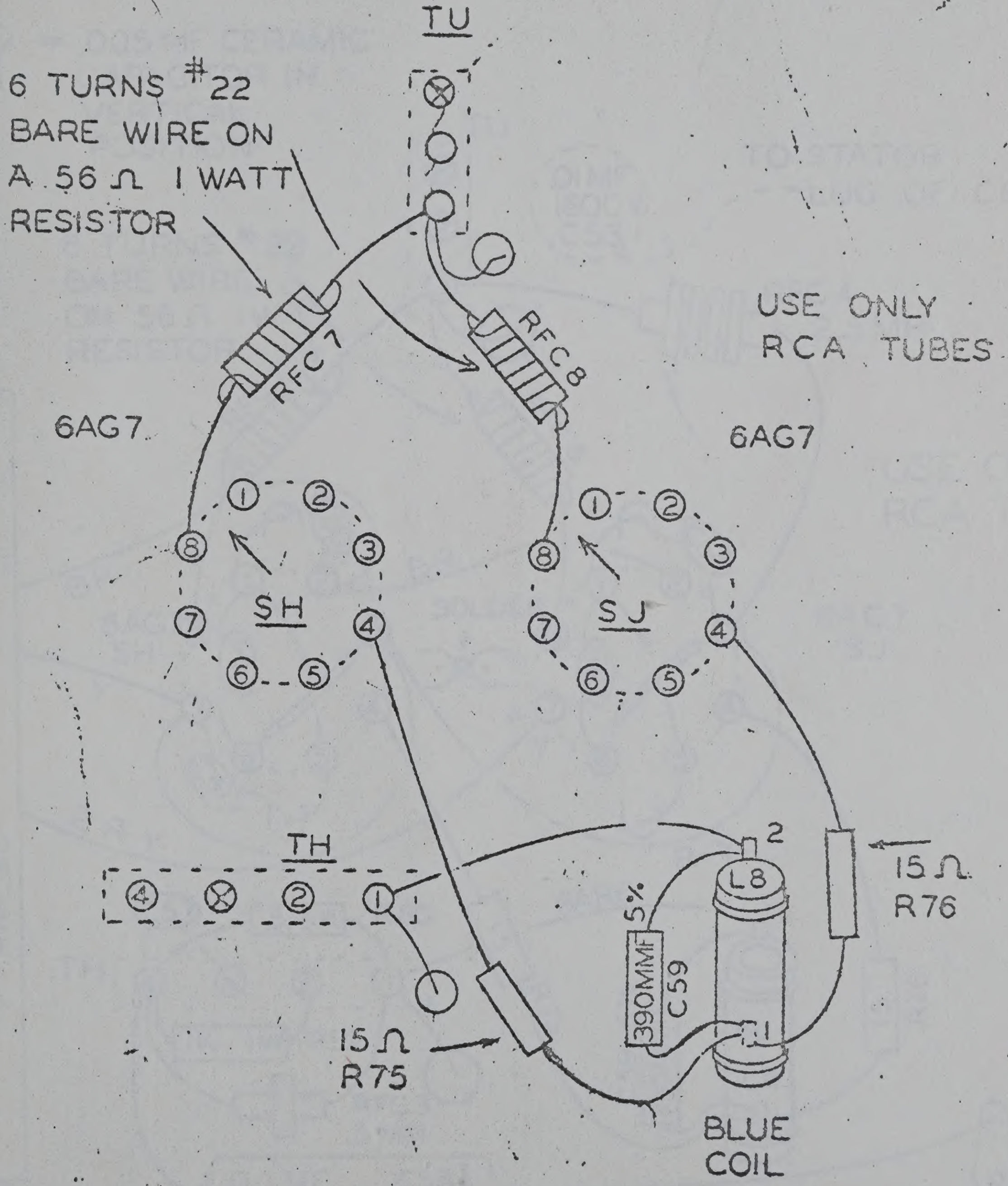
R45, in the cathode of the relay control tube, has been changed from 3.3K 5% to 2.7K 5% in order to lengthen the relay "hold-in" time and sensitivity. If the relay will not release after speaking into the mike, the value of this resistor should be increased.

M137A

CENTRAL ELECTRONICS, INC.

20-A CHANGE NOTICE

For factory-wired units. Equipment shipped from factory having this change has letter "B" stamped after serial number.


TU
6 TURNS #22 BARE WIRE ON A 56 Ω 1 WATT RESISTOR
RFC 7
RFC 8
USE ONLY RCA TUBES
6AG7
6AG7
SH
SJ
① ② ③ ④ ⑤ ⑥ ⑦ ⑧
TH
④ ⊗ ② ①
2
L8
5%
390MMF C59
1
15 Ω R76
15 Ω R75
BLUE COIL

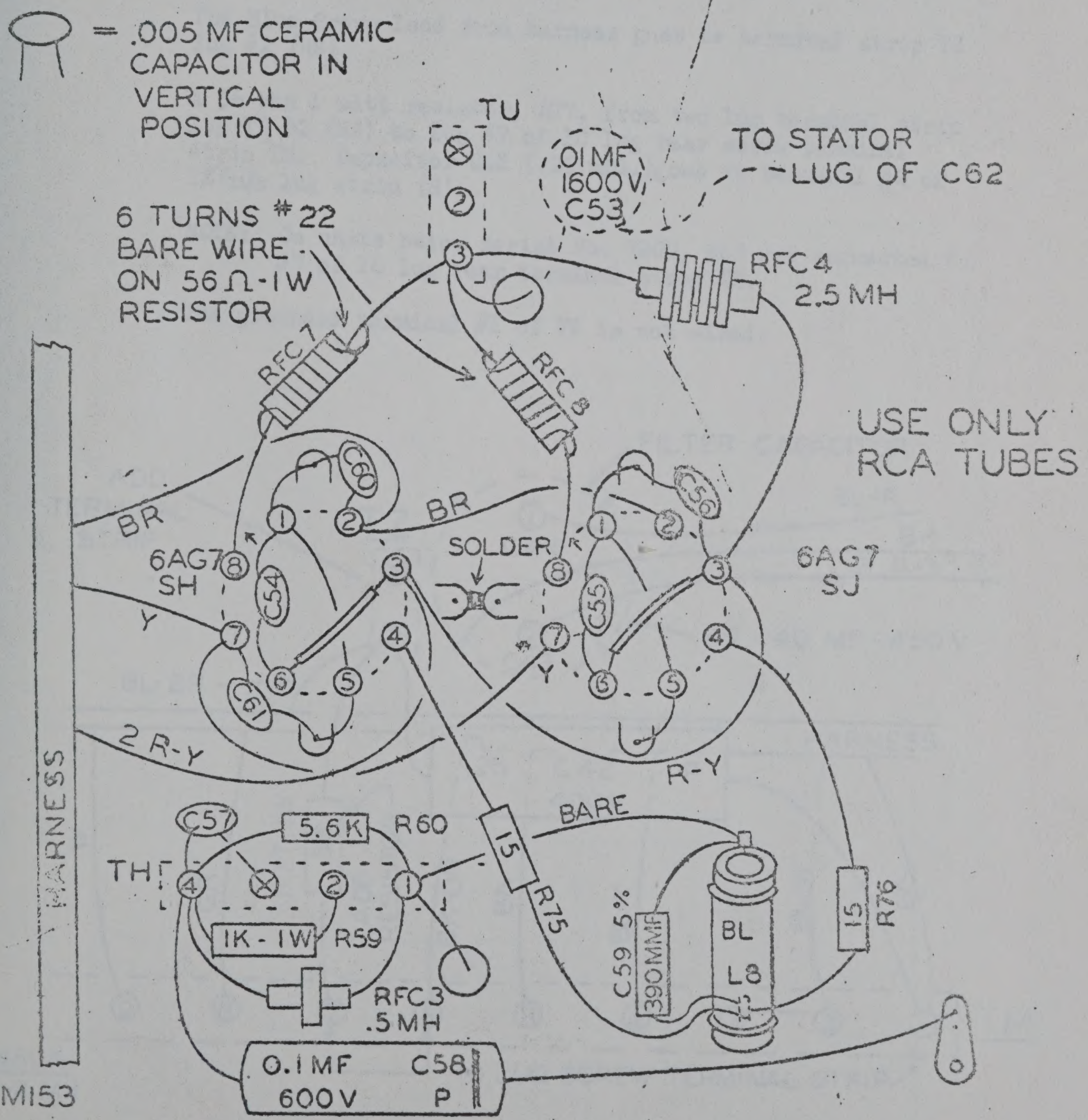
M149A
121 MX
7-19-56

20 A CHANGE NOTICE

UNITS WIRED FROM KITS SHOULD HAVE BY-PASS CAPACITORS AND GENERAL PARTS LAYOUT ARRANGED AS SHOWN BELOW

Even though tube manuals show 6AG7 pin #3 as an internal shield, there is no internal connection.

Some units may have .006 mica capacitors in lieu of .005 ceramics. Some units may have a .006 mica in lieu of the .01 ceramic (C53).


= .005 MF CERAMIC CAPACITOR IN VERTICAL POSITION
TU
⊗
2
3
.01 MF 1600 V C53
TO STATOR LUG OF C62
6 TURNS #22 BARE WIRE ON 56Ω-1W RESISTOR
RFC 4 2.5 MH
RFC 7
RFC 8
USE ONLY RCA TUBES
C60
C56
BR
BR
6AG7 SH
6AG7 SJ
SOLDER
C54
C55
Y
Y
C61
2 R-Y
R-Y
HARNESS
C57
5.6K
R60
BARE
TH
15
R75
15
R76
1K-1W
R59
RFC3 .5 MH
C59 5%
390 MMF
BL
L8
0.1 MF 600 V
C58
P

M153

7-19-56
Printed in USA

CENTRAL ELECTRONICS, INC.

CHANGE NOTICE
10B - 20A

KEYING CIRCUIT CHANGE

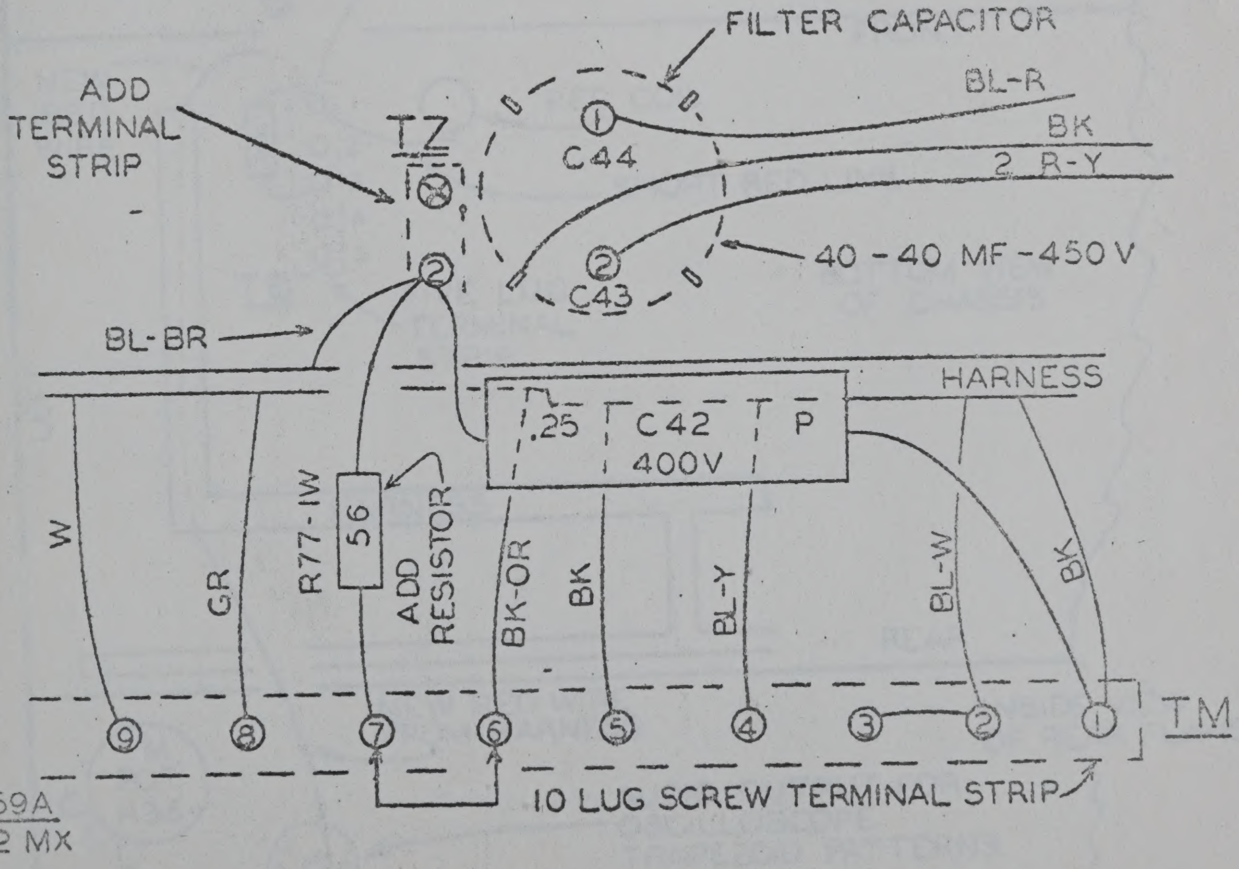
Mount a two lug terminal strip TZ together with the filter capacitor plate as shown.

The Blue-Brown lead from harness goes to terminal strip TZ lug #2 (NS).

A 56 ohm 1 watt resistor, R77, from two lug terminal strip lug TZ #2 (NS) to lug #7 of 10 lug rear screw terminal strip TM. Capacitor C42 (.25 mfd.)goes to terminal #2 of TZ two lug strip (S).

NOTE: On units below serial No. 7300, C42 was connected to #7 of 10 lug rear terminal strip TM.

The grounded terminal #1 of TZ is not wired.


FILTER CAPACITOR
ADD TERMINAL STRIP
TZ
BL-R
BK
2 R-Y
C44
①
②
C43
40 - 40 MF - 450 V
BL-BR
HARNESS
.25
C42
400V
P
W
GR
R77-1W
56
ADD RESISTOR
BK-OR
BK
BL-Y
BL-W
BK
⑨
⑧
⑦
⑥
⑤
④
③
②
①
TM
10 LUG SCREW TERMINAL STRIP

M159A
121-2 MX

CENTRAL ELECTRONICS, INC.

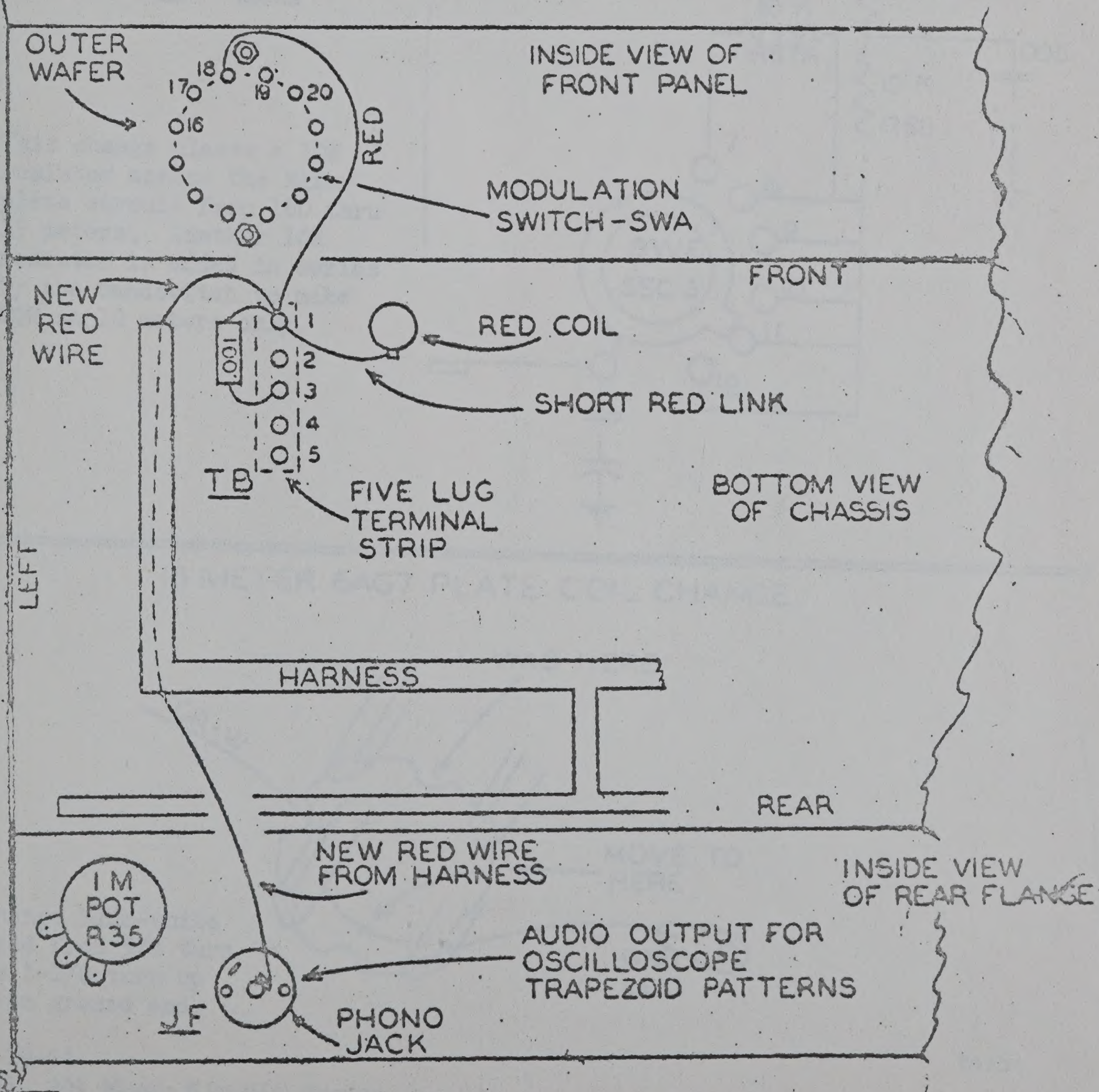
10B-20A CHANGE NOTICE

AUDIO CONNECTION FOR OSCILLOSCOPE

A phono-jack has been added to the rear of the chassis, which connects to the output of one of the modulators. This jack can be used to supply the audio voltage to an oscilloscope, such as the MM-1, for obtaining trapezoid patterns.

Mount the phono connector on the rear of the chassis with #6 hardware, as shown below. The red wire from the harness connects to terminal strip TB, Term. #1, near the front of the chassis. Solder the other end of this lead to the phono jack at the rear of the chassis.

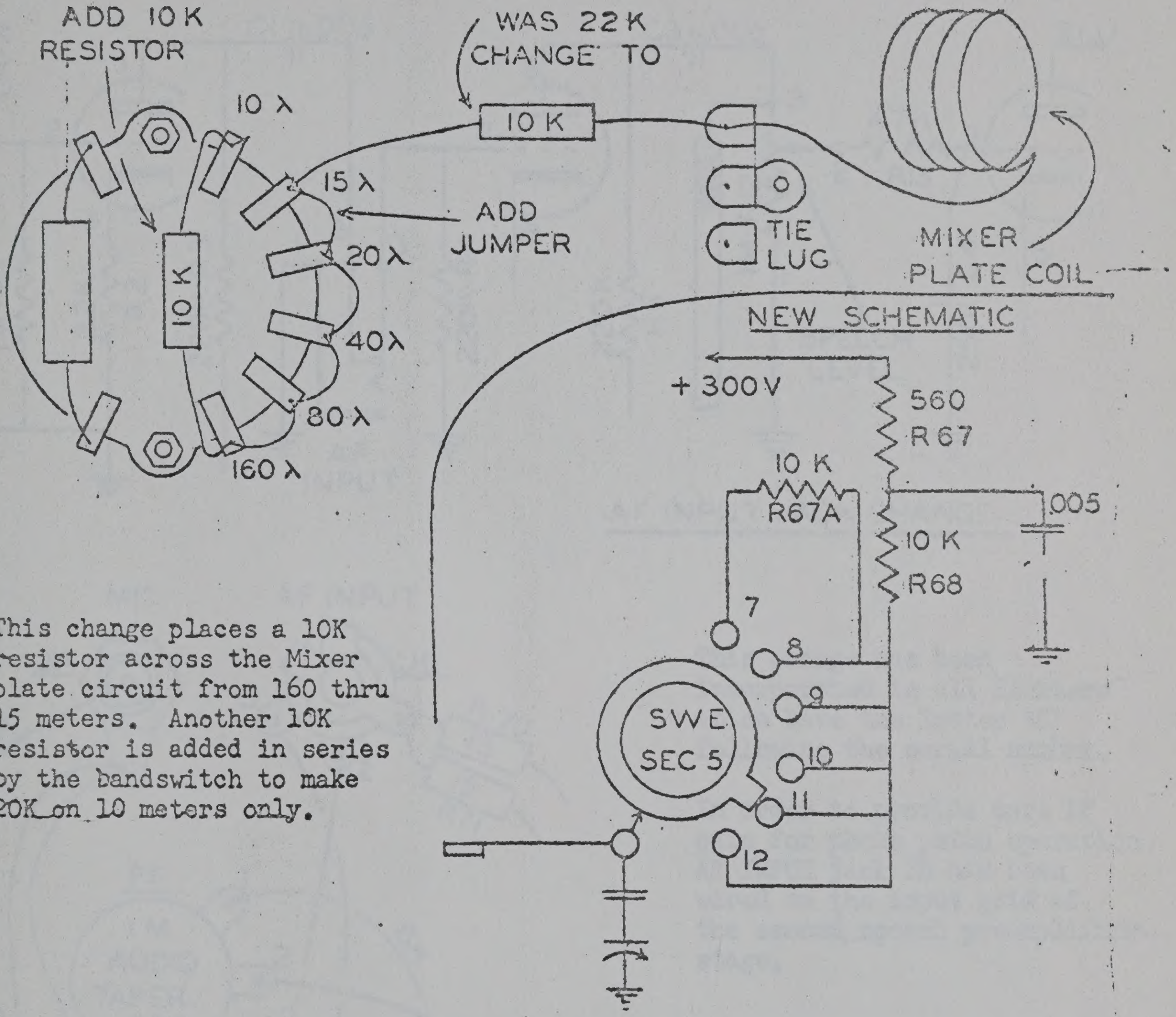
This red wire is included in the harness in all Exciters which have the letter "C" following the serial number. On earlier Exciters the holes must be drilled for the connector and the red wire must be added.


OUTER WAFER
18
17
19
20
16
RED
INSIDE VIEW OF FRONT PANEL
MODULATION SWITCH-SWA
FRONT
NEW RED WIRE
.001
1
2
3
4
5
RED COIL
SHORT RED LINK
TB
FIVE LUG TERMINAL STRIP
BOTTOM VIEW OF CHASSIS
LEFT
HARNESS
REAR
NEW RED WIRE FROM HARNESS
INSIDE VIEW OF REAR FLANGE
1 M POT R35
AUDIO OUTPUT FOR OSCILLOSCOPE TRAPEZOID PATTERNS
JF
PHONO JACK

M16
121-2MX 2-16-57

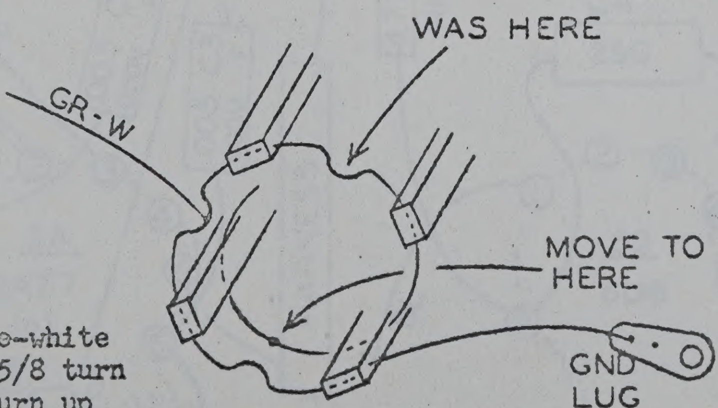
CENTRAL ELECTRONICS, INC.

20A MIXER CIRCUIT CHANGE


ADD 10K RESISTOR
WAS 22K CHANGE TO
10 K
10 λ
15 λ
ADD JUMPER
20 λ
40 λ
80 λ
160 λ
10 K
TIE LUG
MIXER PLATE COIL
NEW SCHEMATIC
+ 300V
560
R67
10 K
R67A
.005
10 K
R68
7
8
9
10
11
12
SWE
SEC 5

This change places a 10K resistor across the Mixer plate circuit from 160 thru 15 meters. Another 10K resistor is added in series by the bandswitch to make 20K on 10 meters only.

15 METER 6AG7 PLATE COIL CHANGE

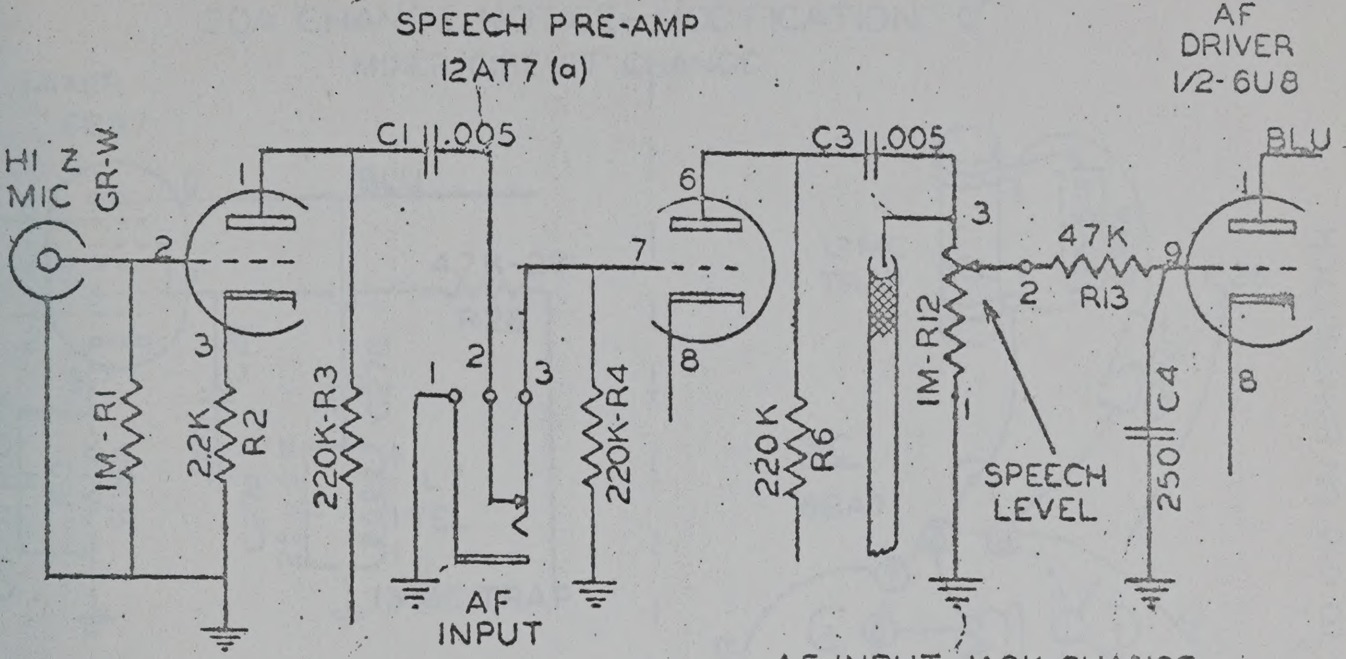

WAS HERE
GR-W
MOVE TO HERE
GND LUG

Change blue-white lead from 5/8 turn to 1-1/8 turn up from ground end.

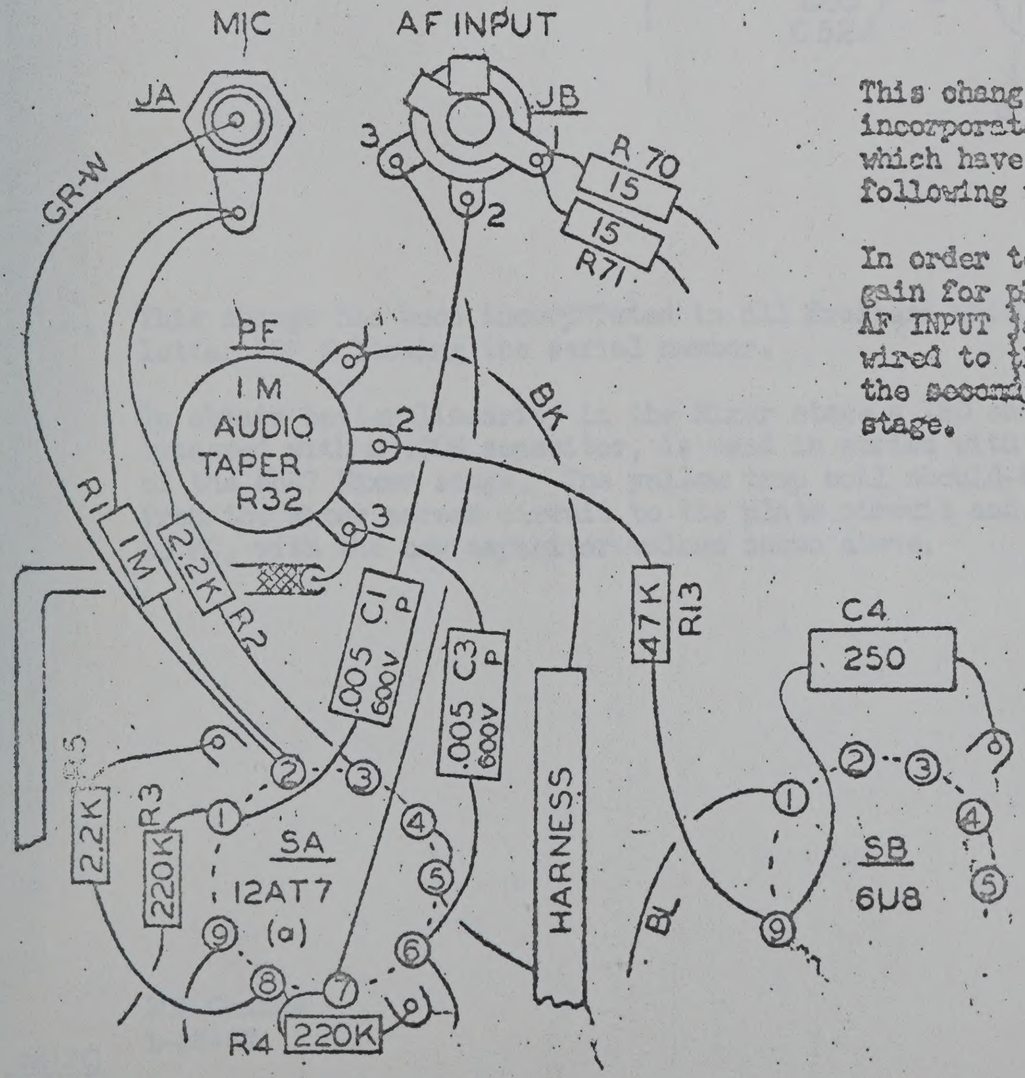
3-19-56
M151 20A Mixer Circuit Change

CENTRAL ELECTRONICS, INC.

10B-20A CHANGE NOTICE - MODIFICATION "C"


SPEECH PRE-AMP
12AT7 (a)
AF
DRIVER
1/2-6U8
HI Z
MIC
GR-W
C1
.005
C3
.005
BLU
1
2
3
6
7
8
2
3
47K
9
R13
8
1M-R1
2.2K
R2
220K-R3
220K-R4
1
2
3
AF
INPUT
220K
R6
1M-R12
1
SPEECH
LEVEL
C4
250

AF INPUT JACK CHANGE


MIC
AF INPUT
JA
JB
GR-W
3
1
2
R 70
15
15
R71
PF
1 M
AUDIO
TAPER
R32
2
3
BK
R1
1M
2.2K
R2
.005 C1
600V P
.005 C3
600V P
HARNESS
47K
R13
C4
250
R5
2.2K
R3
220K
SA
12AT7
(a)
1
2
3
4
5
6
7
8
9
R4
220K
1
2
3
4
5
SB
6U8
9
BL

This change has been incorporated in all Exciters which have the letter "C" following the serial number.

In order to provide more AF gain for phone patch operation AF INPUT Jack JB has been wired to the input grid of the second speech preamplifier stage.

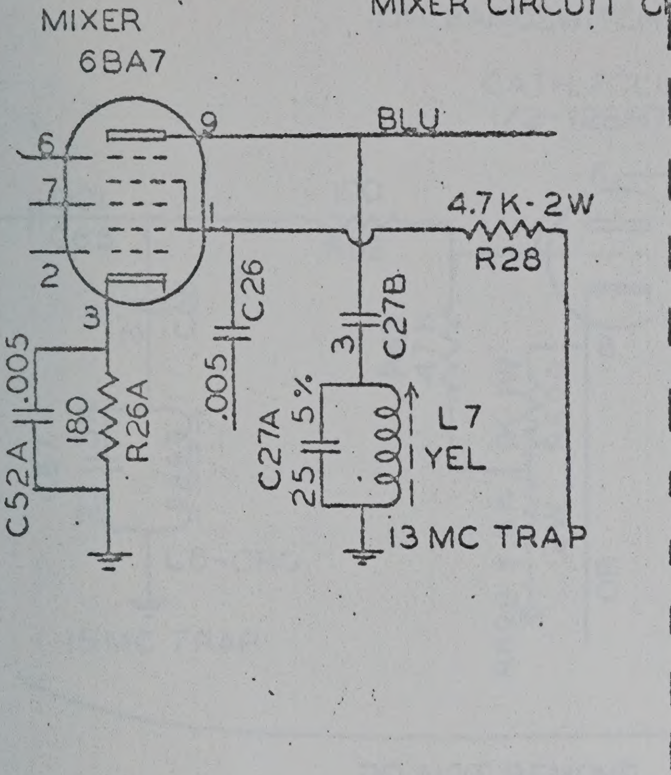
M168
105-7MX

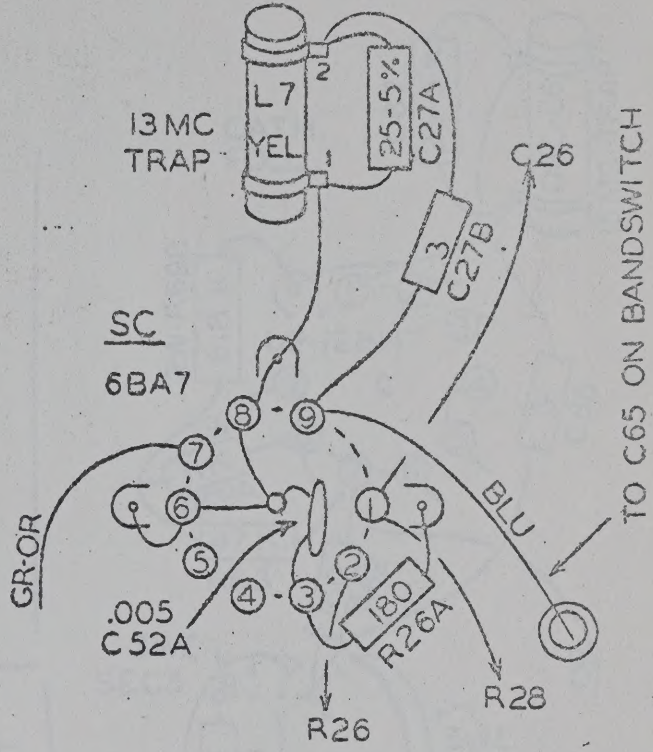
1-28-57
Printed in USA

CENTRAL ELECTRONICS, INC.

20A CHANGE NOTICE- MODIFICATION "C"

MIXER CIRCUIT CHANGE


MIXER
6BA7
9
BLU
6
7
1
2
3
4.7K-2W
R28
C26
.005
C27B
3
.005
C52A
180
R26A
C27A
25
5%
L7
YEL
13 MC TRAP


L7
YEL
13 MC
TRAP
2
1
25-5%
C27A
C26
3
C27B
TO C65 ON BANDSWITCH
SC
6BA7
8
9
7
6
5
1
2
3
4
GR-OR
.005
C52A
180
R26A
BLU
R28
R26

This change has been incorporated in all Exciters which have the letter "C" following the serial number.

To obtain better linearity in the Mixer stage a 180 ohm resistor, bypassed with a .005 capacitor, is used in series with the cathode of the 6BA7 Mixer stage. The yellow trap coil ~~should be moved~~ from the Mixer screen circuit to the plate circuit and tuned to 13 MC, with the new capacitor values shown above.

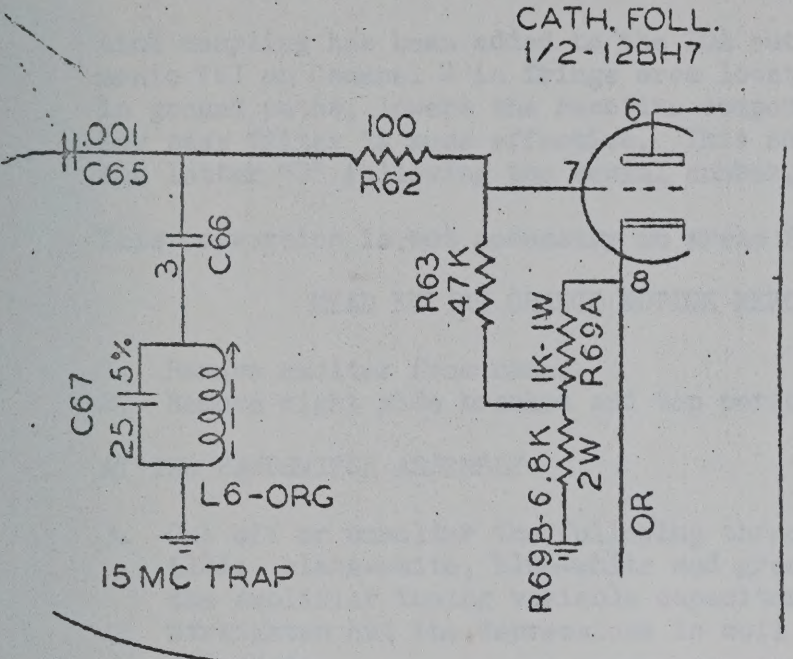
20A Change
1-28-57

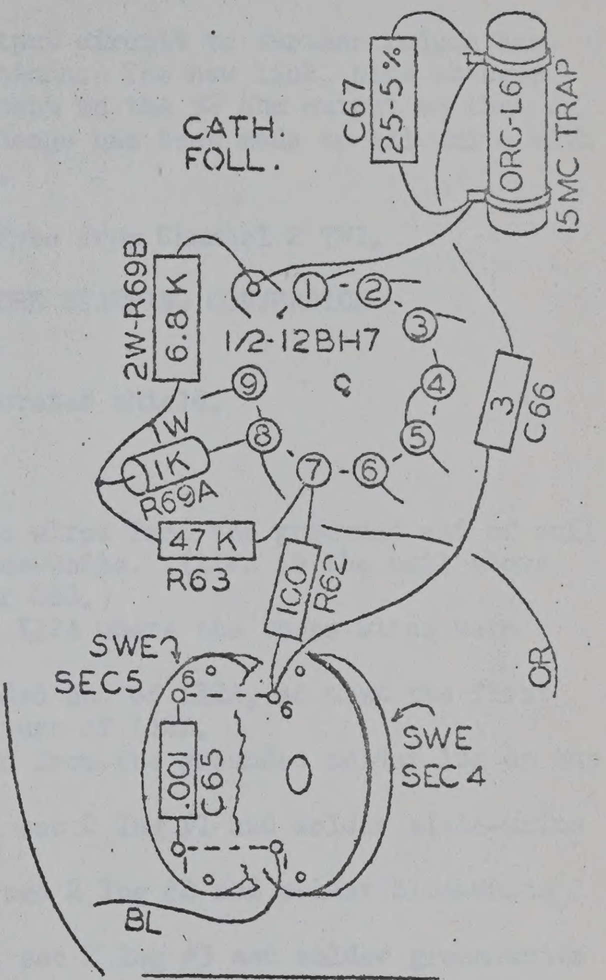
M170
105MX

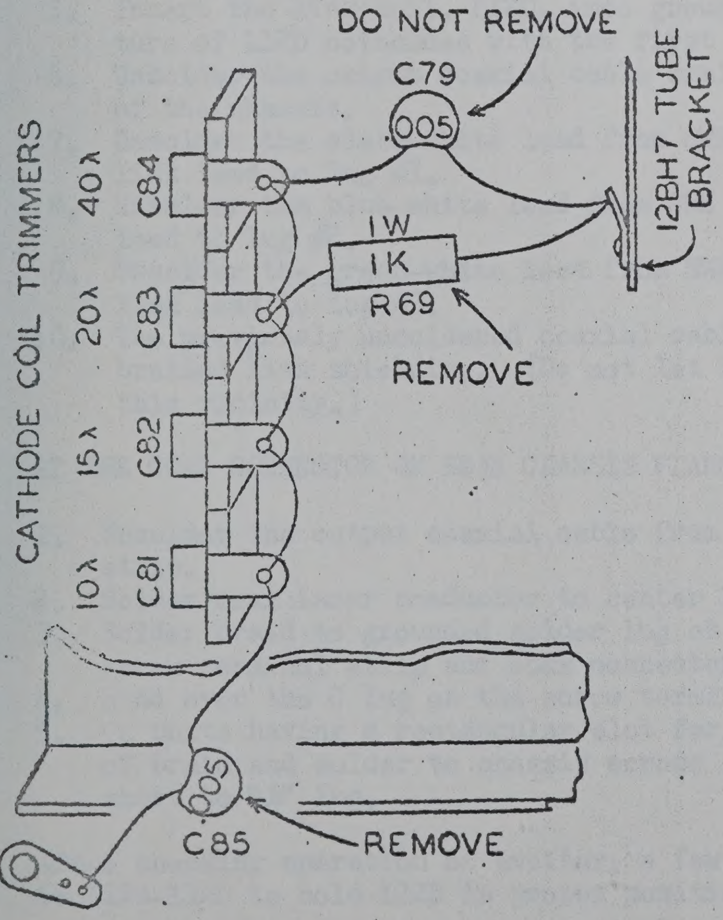
CENTRAL ELECTRONICS, INC.

20A CHANCE NOTICE-MODIFICATION "C"

CATHODE FOLLOWER CIRCUIT CHANGE ON BANDSWITCH ASSEMBLY


CATH. FOLL.
1/2-12BH7
.001
C65
100
R62
6
7
8
3
C66
R63
47K
1K-1W
R69A
C67
25
5%
L6-ORG
R69B-6.8K
2W
OR
15 MC TRAP


CATH.
FOLL.
C67
25-5%
ORG-L6
15 MC TRAP
2W-R69B
6.8 K
1/2-12BH7
1
2
3
4
5
6
7
8
9
1W
1K
R69A
47 K
R63
100
R62
3
C66
OR
SWE
SEC5
SWE
SEC4
.001
C65
6
1
BL


DO NOT REMOVE
C79
.005
12BH7 TUBE
BRACKET
CATHODE COIL TRIMMERS
40λ
C84
20λ
C83
15λ
C82
10λ
C81
1W
1K
R69
REMOVE
.005
C85
REMOVE

This change has been included on the Bandswitching Assembly in all Exciters and kits which have the letter "C" following the serial number. On earlier models, remove R69 and C85, as shown on left. Rewire the cathode circuit as shown above. C81, C82, C83 and C84 should be realigned for maximum output at the middle of each band.

M171 - 1-29-56 Rev. 2-7-57
20A Change
Printed in USA

20A CHANGE NOTICE - MODIFICATION "D"

Addition of Output Link Coil - L12D

Link coupling has been added to the 20A output circuit to further reduce harmonic TVI on Channel 2 in fringe area locations. The new link, plus changes in ground paths, lowers the reactive component in the 52 ohm output so that a low pass filter is more effective. This change has been made to all units with the letter "D" following the serial number.

This conversion is not necessary in areas free from Channel 2 TVI.

READ ENTIRE CHANGE NOTICE BEFORE STARTING CONVERSION

1. Remove exciter from case.
2. Remove right side bracket and top perforated shield.

AT THE BANDSWITCH ASSEMBLY

3. Cut off or unsolder the following three wires from the grounded end of coil L12A: slate-white, blue-white and green-white. (L12A is the coil above the amplifier tuning variable capacitor C62.)
4. Straighten out the depressions in coil L12A where the three wires were attached.
5. Insert the link coil, L12D, into grounded end of L12A, so that the first turn of L12D coincides with the first turn of L12A.
6. Unsolder the output coaxial cable braid from the grounded solder lug on top of the chassis.
7. Unsolder the slate-white lead from SWE sec 2 lug #1 and solder slate-white link lead to lug #1.
8. Unsolder the blue-white lead from SWE sec 2 lug #2 and solder blue-white lead to lug #2.
9. Unsolder the green-white lead from SWE sec 2 lug #3 and solder green-white link lead to lug #3.
10. The previously unsoldered coaxial cable braid must now be soldered to braided link shielding. (Do not let braid short to C62 or to chassis in this vicinity.)

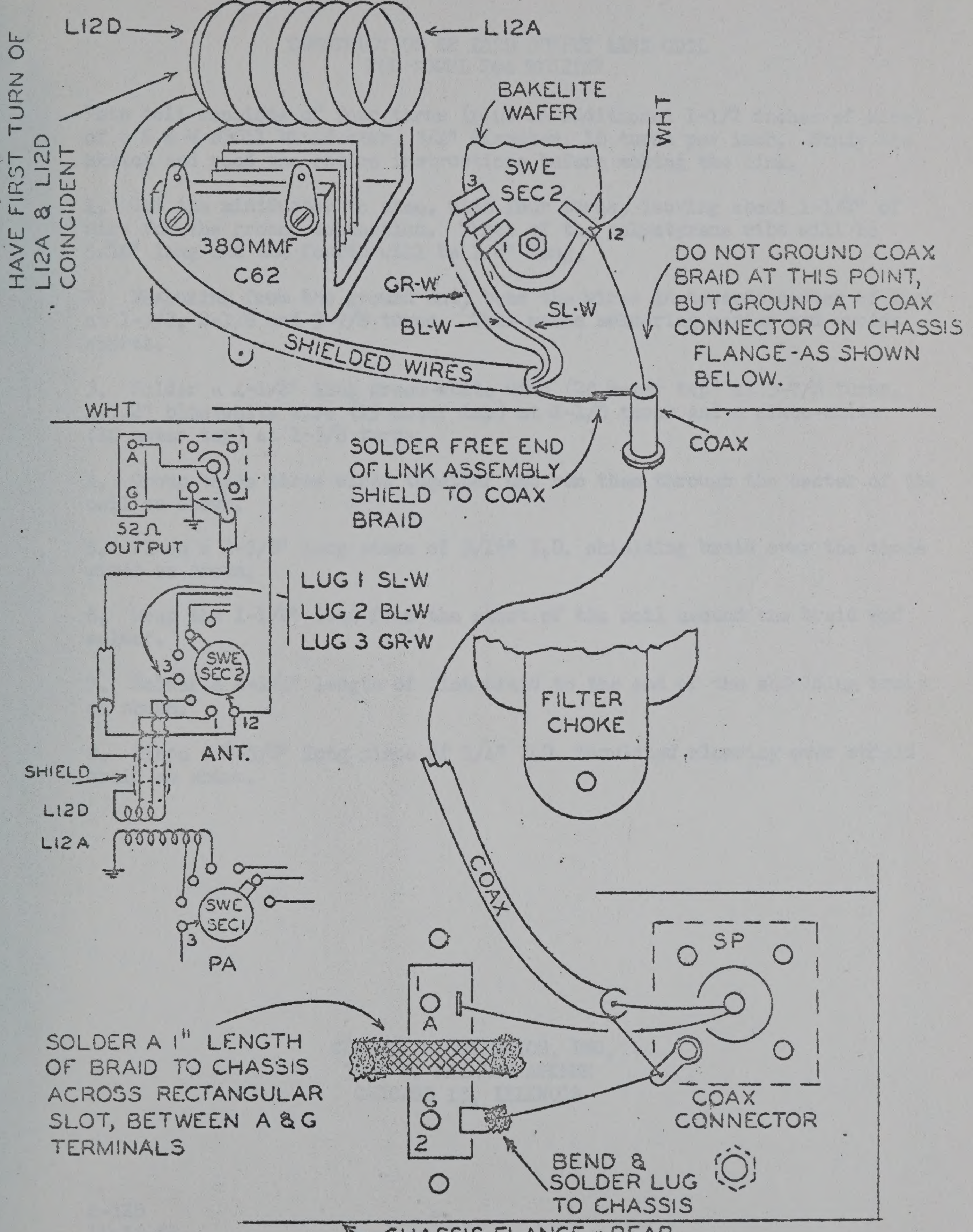
AT THE COAX CONNECTOR ON REAR CHASSIS FLANGE

1. Unsolder the output coaxial cable from the two lugs of the A-G screw terminal strip.
2. Solder coax inner conductor to center lug of coax connector.
3. Solder braid to grounded solder lug at connector. (The jumpers between screw terminal strip and coax connector are to remain as is.)
4. Bend over the G lug on the screw terminal strip and solder to chassis.
5. On units having a rectangular slot for the A-G screw strip, take a 1" length of braid and solder to chassis across slot, between A and G lugs. Do not short to "A" lug.

After checking operation of exciter, a few drops of coil dope should be applied to L12A-L12D to hold L12D in proper position.

20A Change "D"
1-17-58
Printed in USA

20A CHANGE NOTICE


L12D
L12A
HAVE FIRST TURN OF L12A & L12D COINCIDENT
BAKELITE WAFER
WHT
SWE SEC 2
3
1
12
380MMF
C62
GR-W
SL-W
BL-W
SHIELDED WIRES
DO NOT GROUND COAX BRAID AT THIS POINT, BUT GROUND AT COAX CONNECTOR ON CHASSIS FLANGE-AS SHOWN BELOW.
COAX
WHT
SOLDER FREE END OF LINK ASSEMBLY SHIELD TO COAX BRAID
A
G
L
52Ω OUTPUT
LUG 1 SL-W
LUG 2 BL-W
LUG 3 GR-W
SWE SEC 2
3
1
12
ANT.
SHIELD
L12D
L12A
SWE SEC1
3
PA
FILTER CHOKE
COAX
SP
COAX CONNECTOR
1
A
G
2
SOLDER A 1" LENGTH OF BRAID TO CHASSIS ACROSS RECTANGULAR SLOT, BETWEEN A & G TERMINALS
BEND & SOLDER LUG TO CHASSIS
CHASSIS FLANGE - REAR

M179
12-17-57

CONSTRUCTION OF L12D OUTPUT LINK COIL
FOR MODEL 20A EXCITER

This coil consists of four turns (plus an additional 1-1/2 inches of wire) of a B & W #3011 Miniductor, 3/4" diameter, 16 turns per inch. Study the sketch and read the entire instructions before making the link.

1. Cut the miniductor to size, with four turns, leaving about 1-1/2" of wire for the ground connection. Three of the polystyrene ribs will be 5/16" long and the fourth will be 3/8" long.

2. Measuring from the ground end, bend the wires in towards center of link at 1-3/8, 2-1/8 and 3-7/8 turns. This makes soldering easier and avoids shorts.

3. Solder a 4-1/2" long green-white wire (20 meter tap) at 3-7/8 turns, 4-1/2" blue-white wire (15 meter tap) at 2-1/8 turns and a slate-white (10 meter tap) at 1-3/8 turns.

4. Group these three wires together and run them through the center of the coil as shown.

5. Place a 2-3/8" long piece of 3/16" I.D. shielding braid over the three wires as shown.

6. Wrap the 1-1/2" lead from the start of the coil around the braid and solder.

7. Solder a 2-1/4" length of flat braid to the end of the shielding braid as shown.

8. Place a 2-5/8" long piece of 1/4" I.D. insulated sleeving over shield braid as shown.

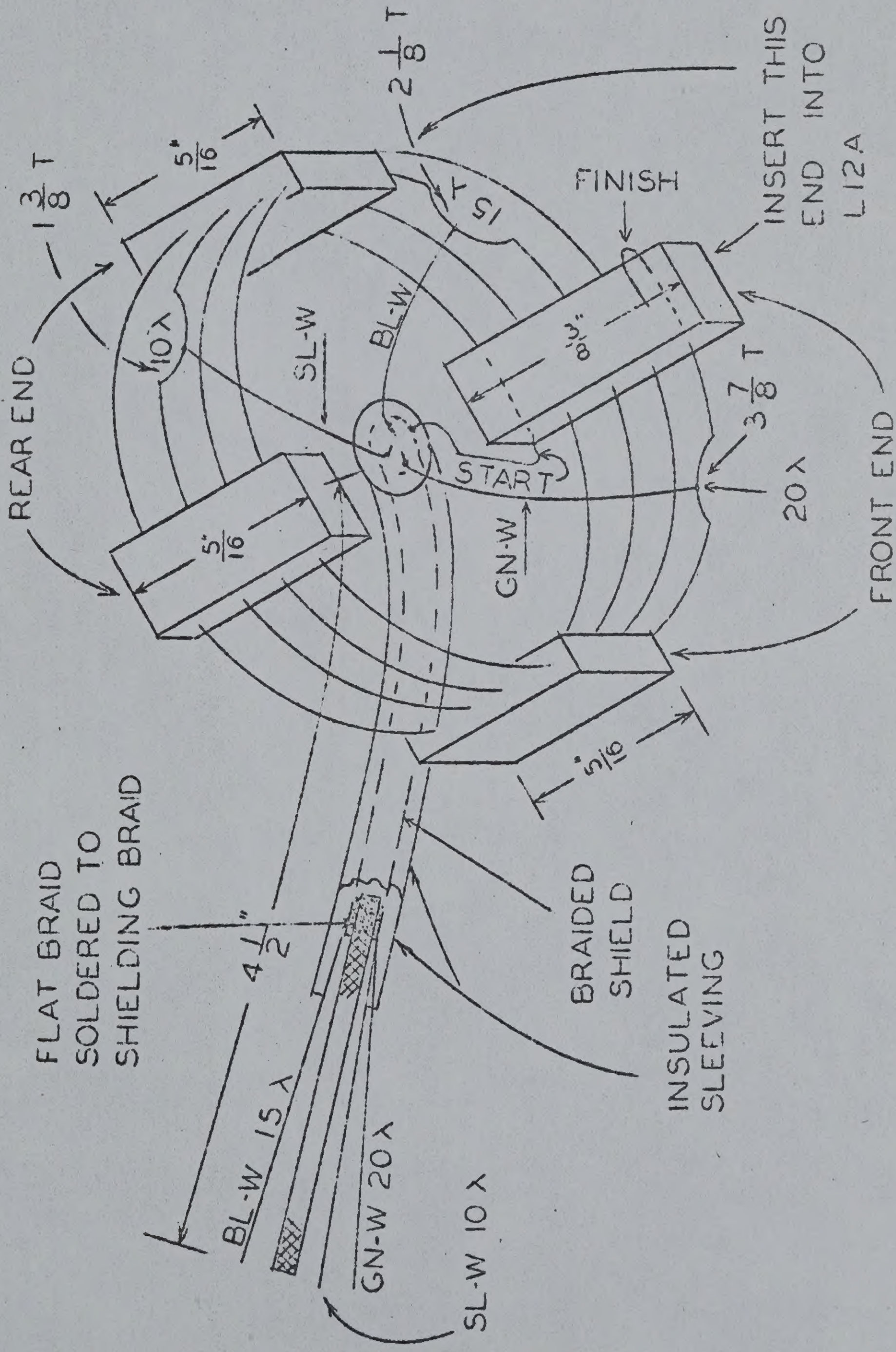
CENTRAL ELECTRONICS, INC.
1247 W. BELMONT AVENUE
CHICAGO 13, ILLINOIS

OUTPUT LINK COIL FOR 20A

B & W MINIDUCTOR # 3011 3/4" DIA., 16 TURNS PER INCH.

4 TURNS, PLUS 1 1/2" ADDITIONAL FOR GROUND CONNECTION

L 12D


1 3/8 T
5/16
5"/16
2 1/8 T
INSERT THIS END INTO L12A
FINISH
15 λ
BL-W
SL-W
10 λ
REAR END
5/16
START
3 7/8 T
20 λ
FRONT END
GN-W
5/16
FLAT BRAID SOLDERED TO SHIELDING BRAID
4 1/2"
BRAIDED SHIELD
INSULATED SLEEVING
BL-W 15 λ
GN-W 20 λ
SL-W 10 λ

M 205

L-12D
11-6-58
Printed in USA

CENTRAL ELECTRONICS, INC.

10-20A CHANGE NOTICE

This is a summary of changes made during production of Multiphase Exciter Model 20A. Some of these changes are applicable to Model 10B and are noted accordingly. This information is presented in accordance with Central Electronics policy to keep its customers advised of improvements.

The first change occurred on 6-21-54 when an improved 9 MC master crystal oscillator was incorporated using a 6U8 in lieu of the 12BH7. This information will be sent upon request.

Later the 3 mmf capacitor (C72) on pin #7 of the grid of the 12BH7 cathode follower was removed. This increased the 10 meter drive.

In the latter part of 1954 a bad batch of 6AG7 tubes was received from GE. The tube would develop control grid to screen shorts and burn out the 180 ohm series screen resistors R57 and R58. These resistors were removed and jumpers installed so the fuse would blow, instead of a resistor, if a tube shorted. Production switched to RCA type 6AG7 tubes with complete success.

Some wiring changes to grounds, etc., are shown on the attached Change Notices, as well as information on the voice control relay.

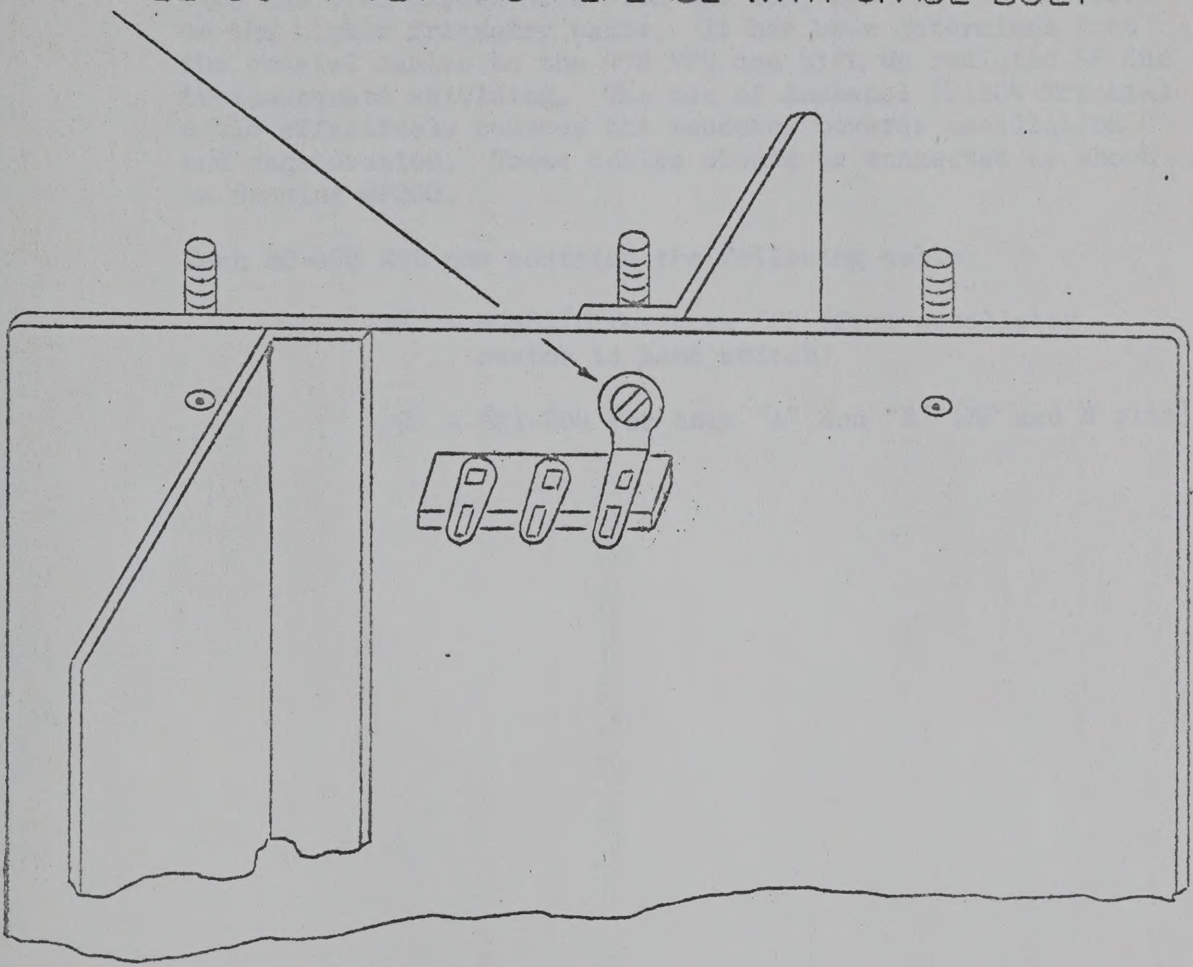
It is recommended that the changes shown on Notice M151 be made to the 6BA7 mixer plate circuit in the 20A Bandswitch Assembly, if the changes outlined on Notice M149A are made. These changes will raise the 10 meter output to almost equal that obtained on the lower frequencies. The Exciter exhibits no tendency toward parasitics, even without load.

Change tuning slugs in the orange and yellow 15 MC trap coils from half brass and iron to all iron. The brass ring on the slug can generally be removed. This change increases 15 MC rejection.

Early production units had a 330 ohm resistor across the VFO input coax. This was removed to raise the mixer injection on 16 MC for improved 40 meter operation.

20A Change Notice
3-19-56

CENTRAL ELECTRONICS, INCORPORATED 20A CHANGE NOTICE



DRILL OUT RIVET AND REPLACE WITH SPADE BOLT

Tendency toward oscillation can be reduced on the older 20As by removing the rivet that holds the three lug terminal strip in the 6AG7 compartment, and installing a 6-32 spade bolt. A matching hole must be drilled in the perforated metal top shield. An additional 6-32 nut and lockwasher should be used to insure good contact with the cover.

20A Change Notice
11-11-59
Printed in USA

BC 458 VFO CHANGE NOTICE

There have been several cases where oscillation or regeneration has been experienced with the 10A, 10B and 20A Exciters on the higher frequency bands. It has been determined that the coaxial cables to the 458 VFO can pick up radiated RF due to inadequate shielding. The use of Amphenol #21204 Triaxial cable effectively reduces the tendency towards oscillation and regeneration. These cables should be connected as shown on drawing #P208.

Each BC-458 Kit now contains the following cable:

18" - RG58A/U for coax "F" (from oscillator stator to band switch)

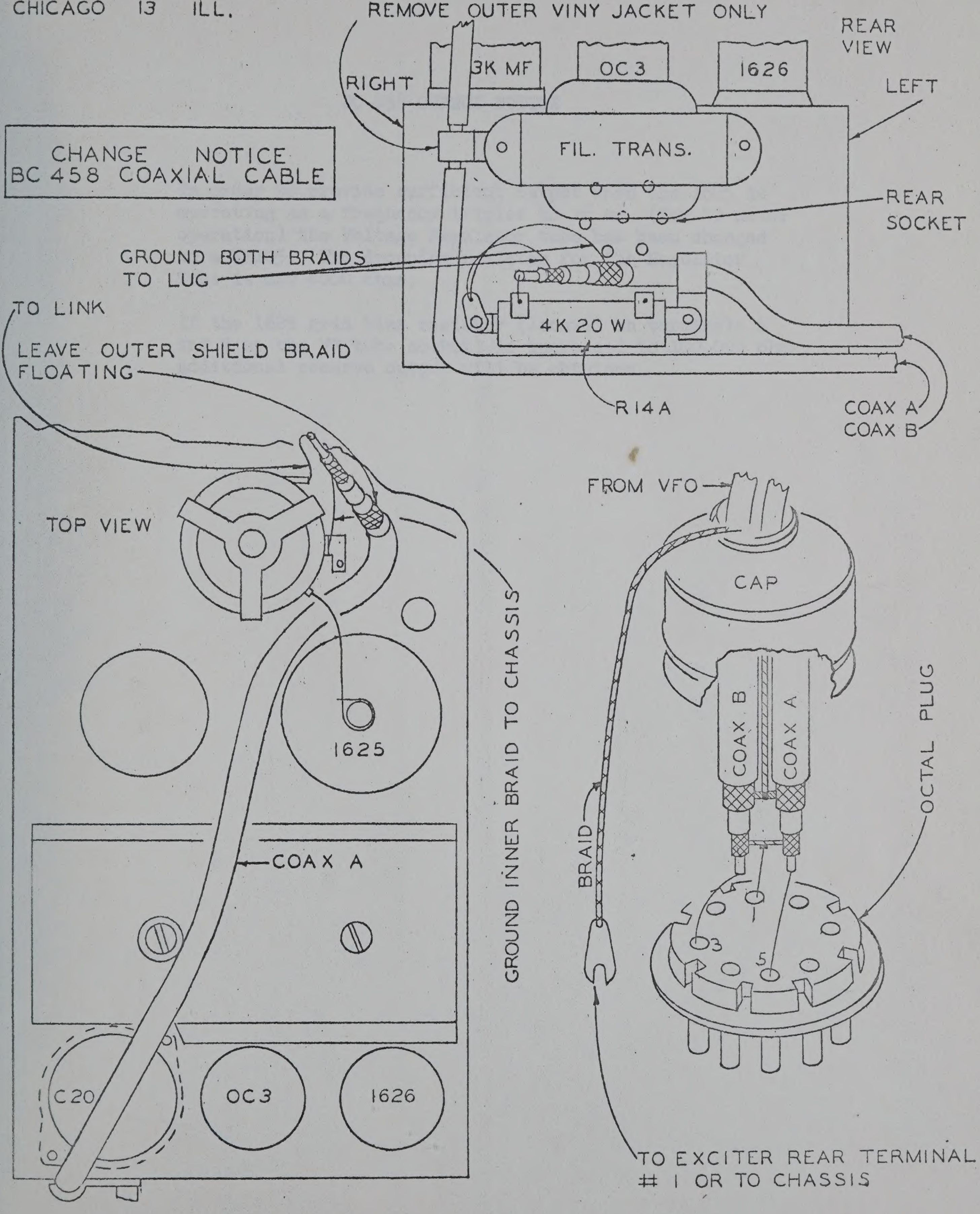
9' - #21-204 for coax "A" and "B" (RF and B plus)

VFO Change
4-29-59
Printed in USA

CENTRAL ELECTRONICS
1247 W. BELMONT AVE.
CHICAGO 13 ILL.

P208 4-13-59

CHANGE NOTICE
BC 458 COAXIAL CABLE


REMOVE OUTER VINY JACKET ONLY
REAR VIEW
3K MF
OC3
1626
RIGHT
LEFT
FIL. TRANS.
REAR SOCKET
GROUND BOTH BRAIDS TO LUG
4K 20 W
TO LINK
LEAVE OUTER SHIELD BRAID FLOATING
R14A
COAX A
COAX B
FROM VFO
TOP VIEW
CAP
GROUND INNER BRAID TO CHASSIS
1625
COAX B
COAX A
OCTAL PLUG
BRAID
COAX A
3
1
5
C20
OC3
1626
TO EXCITER REAR TERMINAL # 1 OR TO CHASSIS

PRINTED IN U.S.A.
BC-458 CHANGE NOTICE

BC-458 CHANGE NOTICE

In order to provide sufficient output when the 1625 is operating as a frequency tripler to 16 mc. (for 40 meter operation) the Voltage Regulator tube has been changed to a VR105. The dropping resistor for the Regulator Tube is now 4000 ohms.

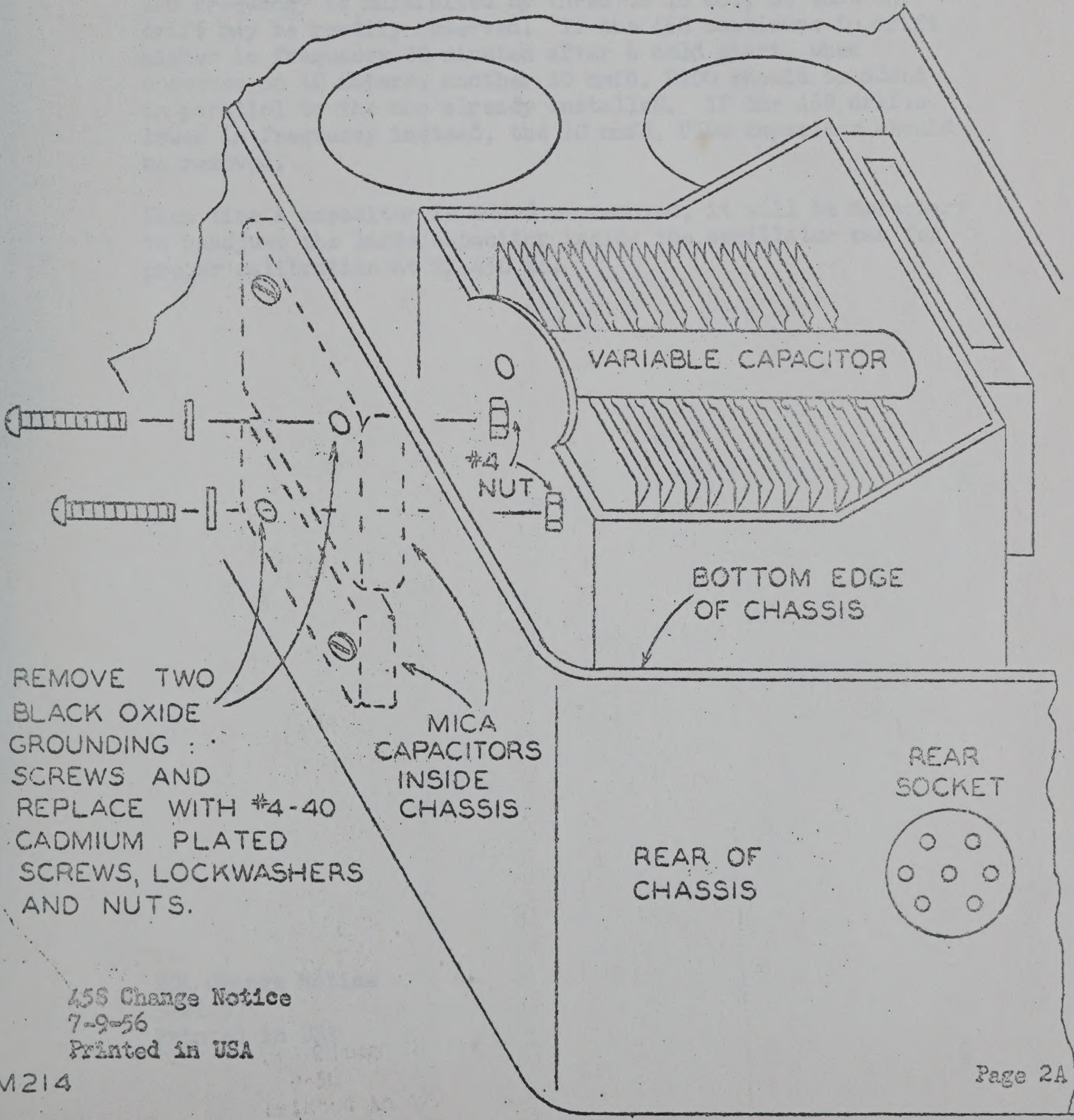
If the 1625 grid bias resistor (located on terminals 6 and 7 on the VR tube socket) is increased to 100,000 ohms, additional reserve output will be obtained.

VFO Change Notice
5-11-56
Printed in USA

458 CHANGE NOTICE

The black oxide screws sometimes make poor R.F. contact and must be replaced. Before installing coax F, remove two black oxide #3 nuts, screws and washers from the right side of chassis near rear, as shown. These two screws hold two mica capacitors and two ground lugs to the side of chassis. The two ground lugs should be cleaned, if necessary, to insure good contact. Two #4-40 x 5/8" screws, nuts and lockwashers are used to replace the #3 screws, as shown.

Place a lockwasher under head of screw; push through hole in side of chassis and capacitor. A #4 nut is used to hold lug and capacitor to inside of chassis. If your 458 is painted black wrinkle, it is advisable to scratch paint from around the two holes before adding #4 screws.


VARIABLE CAPACITOR
#4 NUT
BOTTOM EDGE OF CHASSIS
REMOVE TWO BLACK OXIDE GROUNDING SCREWS AND REPLACE WITH #4-40 CADMIUM PLATED SCREWS, LOCKWASHERS AND NUTS.
MICA CAPACITORS INSIDE CHASSIS
REAR SOCKET
REAR OF CHASSIS

TEMPERATURE COMPENSATION OF THE VFO

In order to achieve good stability in a reasonable period of time, the AVERAGE BC-458 requires a 10 mmfd. P100 temperature compensating capacitor, C26, inside the oscillator can. Be sure to remove the 3 mmfd. neg. 750 and change the 1626 grid capacitor to 180 mmf. zero temperature coefficient.

Occasionally some units may require no positive compensation at all, while others require 20 mmfd. P100.

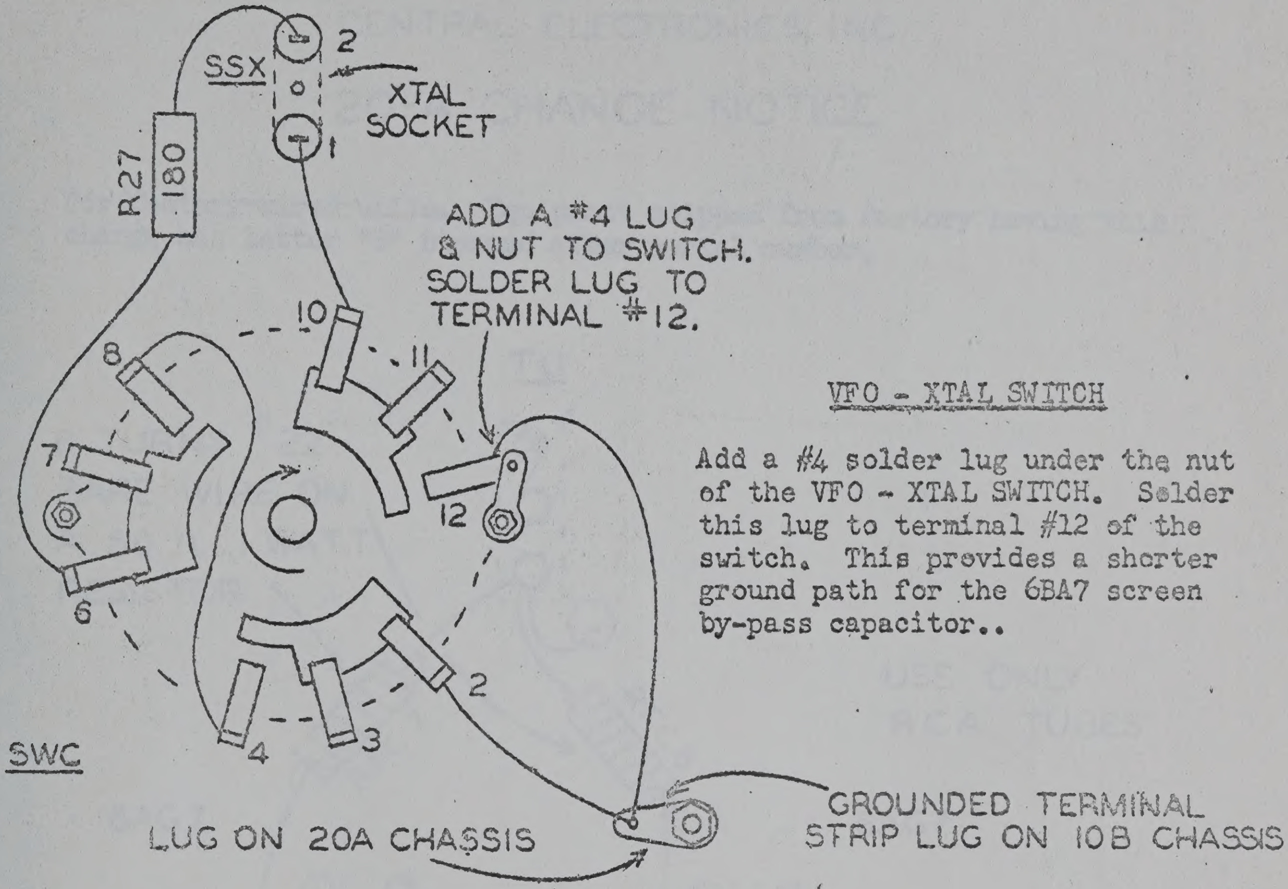
It is recommended that all drift checks are made with the Exciter operating on the 40 meter band, where the fundamental VFO frequency is multiplied by three to 16 mc., so that any drift may be readily observed. If the 458 continues to drift higher in frequency 20 minutes after a cold start, when observed on 40 meters, another 10 mmfd. P100 should be added in parallel to the one already installed. If the 458 drifts lower in frequency instead, the 10 mmfd. P100 capacitor should be removed.

Each time a capacitor is added or removed, it will be necessary to readjust the large capacitor inside the oscillator can for proper calibration at 21,450 kc.

20A Change Notice
3-21-57
Printed in USA

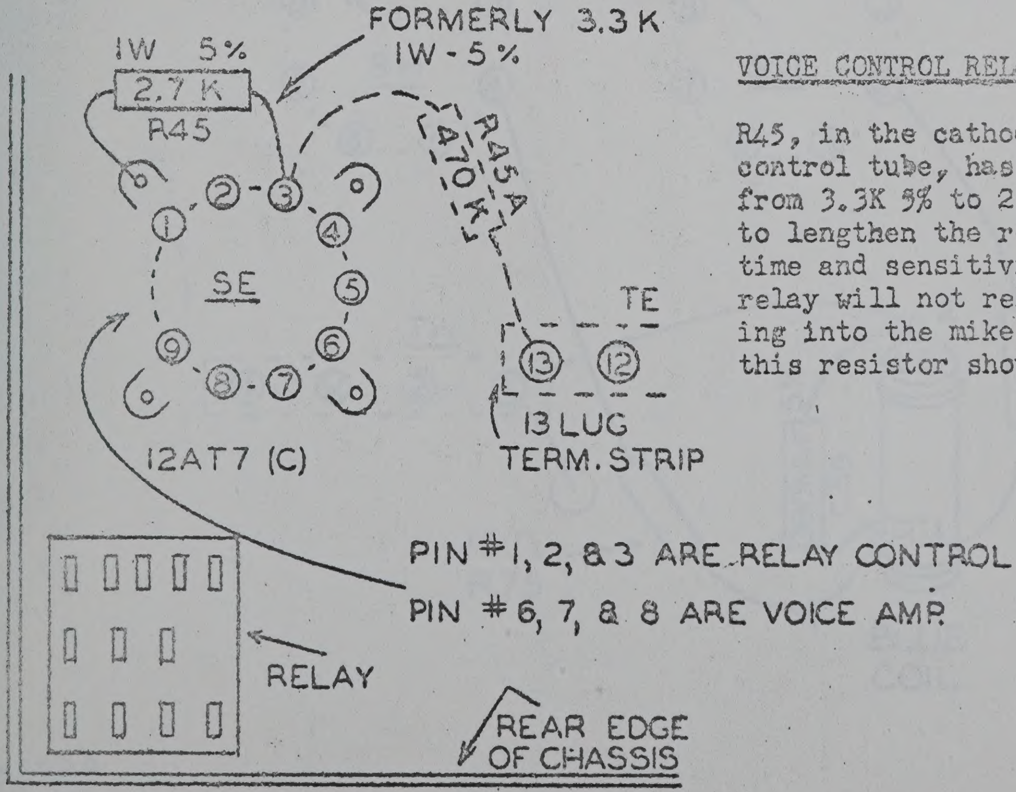
CENTRAL ELECTRONICS, INC.

10B—20A CHANGES


SSX
2
XTAL SOCKET
1
R27
180
ADD A #4 LUG & NUT TO SWITCH. SOLDER LUG TO TERMINAL #12.
10
11
8
7
12
6
2
3
4
SWC
LUG ON 20A CHASSIS
GROUNDED TERMINAL STRIP LUG ON 10B CHASSIS

VFO - XTAL SWITCH

Add a #4 solder lug under the nut of the VFO - XTAL SWITCH. Solder this lug to terminal #12 of the switch. This provides a shorter ground path for the 6BA7 screen by-pass capacitor..


FORMERLY 3.3 K 1W - 5%
1W 5%
2.7 K
R45
R45A 470 K
1
2
3
4
5
6
7
8
9
SE
TE
13
12
13 LUG TERM. STRIP
12AT7 (C)
PIN #1, 2, & 3 ARE RELAY CONTROL
PIN #6, 7, & 8 ARE VOICE AMP.
RELAY
REAR EDGE OF CHASSIS

VOICE CONTROL RELAY CIRCUIT CHANGE

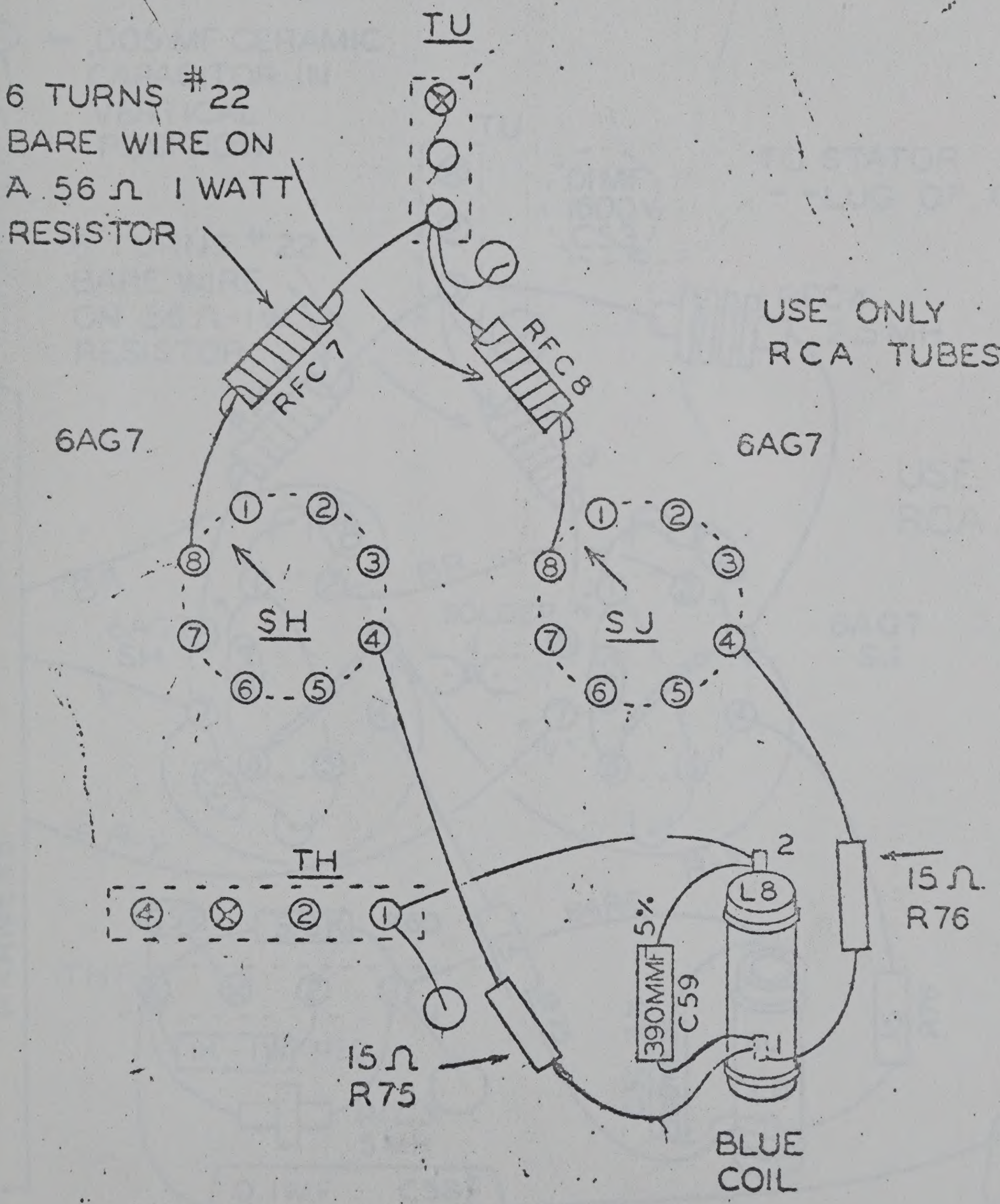
R45, in the cathode of the relay control tube, has been changed from 3.3K 5% to 2.7K 5% in order to lengthen the relay "hold-in" time and sensitivity. If the relay will not release after speaking into the mike, the value of this resistor should be increased.

M137A

CENTRAL ELECTRONICS, INC.

20-A CHANGE NOTICE

For factory-wired units. Equipment shipped from factory having this change has letter "B" stamped after serial number.


TU
6 TURNS #22
BARE WIRE ON
A 56 Ω 1 WATT
RESISTOR
RFC7
RFC8
USE ONLY
RCA TUBES
6AG7
6AG7
SH
SJ
①
②
③
④
⑤
⑥
⑦
⑧
TH
④
②
①
2
L8
1
5%
390MMF
C59
15 Ω
R76
15 Ω
R75
BLUE
COIL

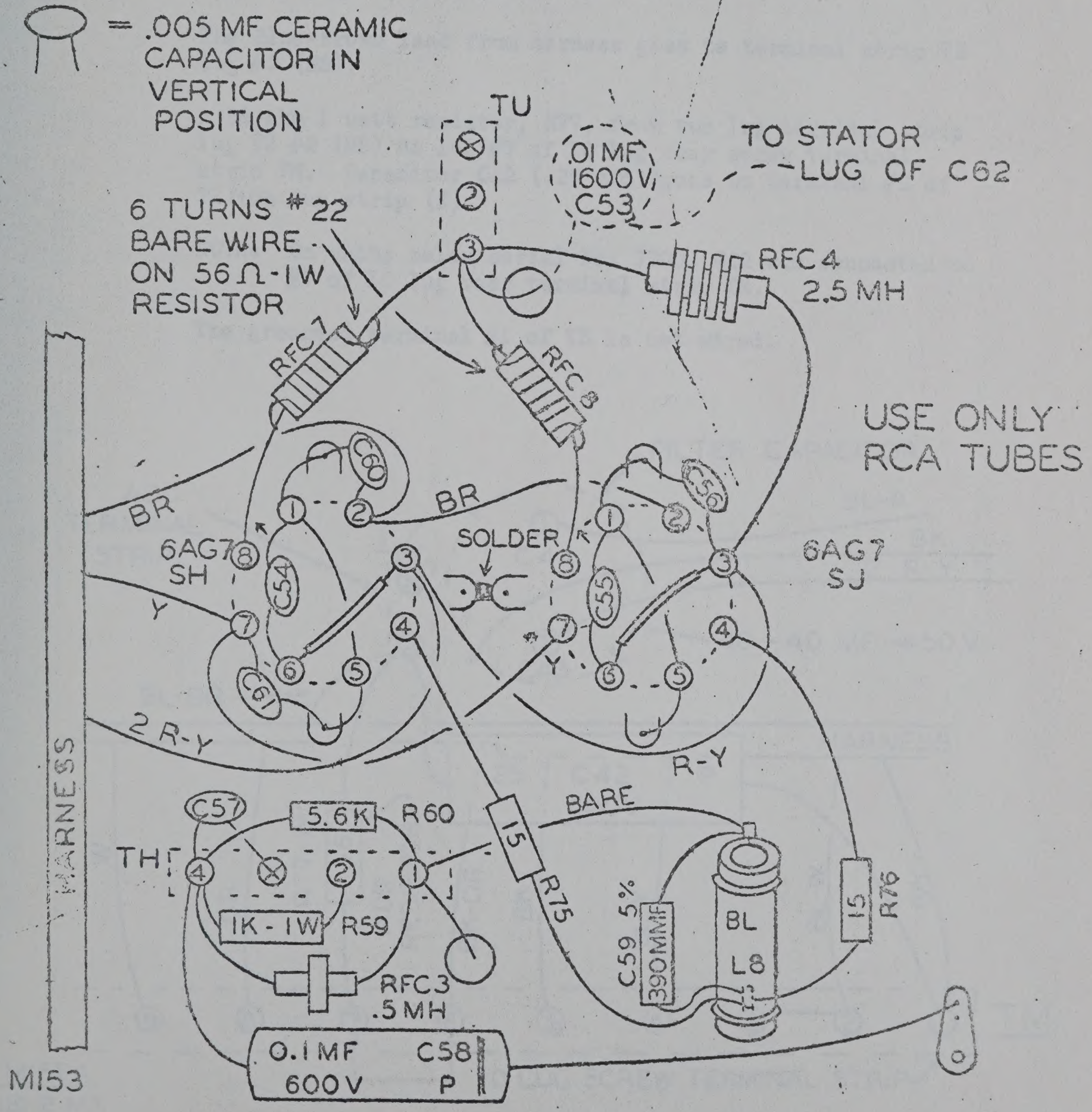
M 149A
121 MX
7-19-56

20 A CHANGE NOTICE

UNITS WIRED FROM KITS SHOULD HAVE BY-PASS CAPACITORS
AND GENERAL PARTS LAYOUT ARRANGED AS SHOWN BELOW

Even though tube manuals show 6AG7 pin #3 as an internal shield, there is no internal connection.

Some units may have .006 mica capacitors in lieu of .005 ceramics. Some units may have a .006 mica in lieu of the .01 ceramic (C53).


= .005 MF CERAMIC CAPACITOR IN VERTICAL POSITION
TU
.01 MF 1600 V C53
TO STATOR LUG OF C62
6 TURNS #22 BARE WIRE ON 56Ω-1W RESISTOR
RFC 4 2.5 MH
RFC 7
RFC 8
USE ONLY RCA TUBES
C60
C56
BR
BR
6AG7 SH
6AG7 SJ
SOLDER
C54
C55
Y
Y
C61
2 R-Y
R-Y
HARNESS
C57
5.6K R60
BARE
TH
15 R75
C59 5% 390 MMF
BL L8
15 R76
1K-1W R59
RFC3 .5 MH
0.1 MF 600 V C58 P
1
2
3
4
5
6
7
8

M153

7-19-56
Printed in USA

CENTRAL ELECTRONICS, INC.

CHANGE NOTICE
10B - 20A

KEYING CIRCUIT CHANGE

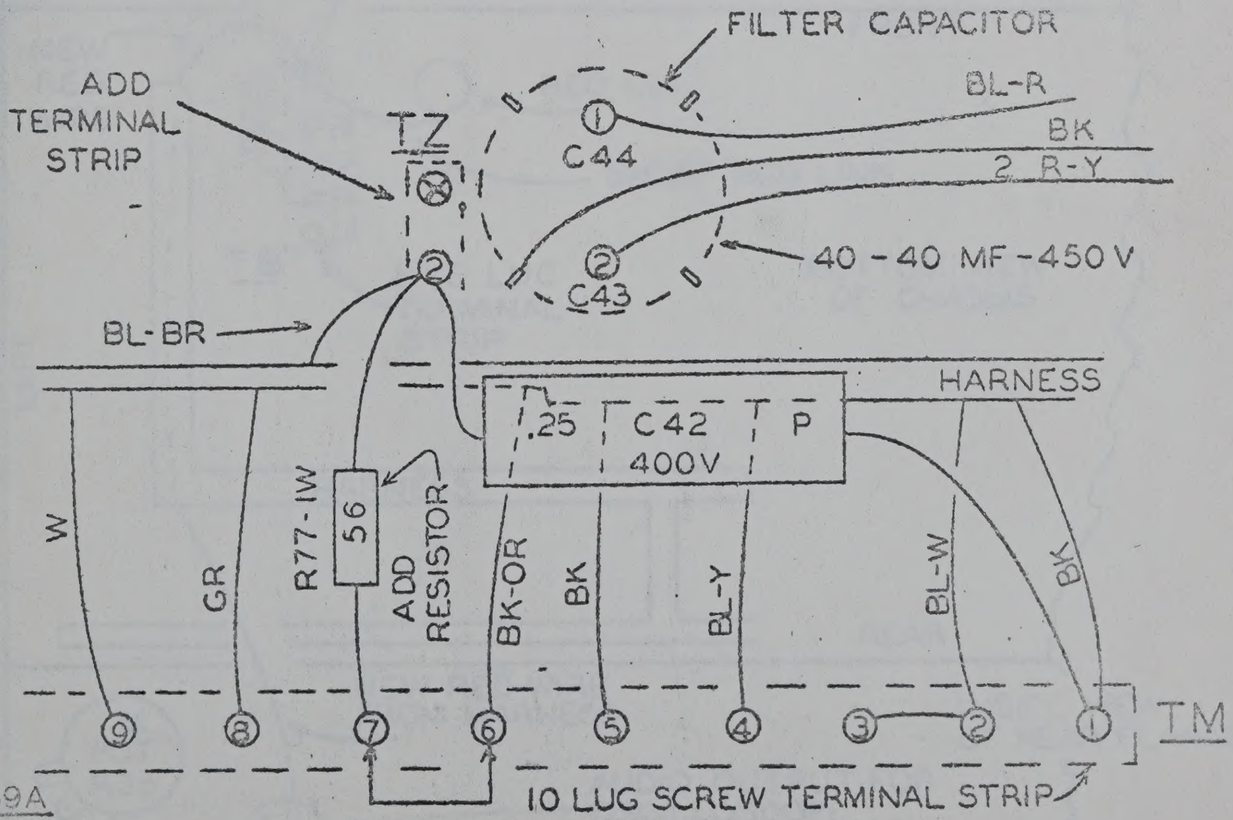
Mount a two lug terminal strip TZ together with the filter capacitor plate as shown.

The Blue-Brown lead from harness goes to terminal strip TZ lug #2 (NS).

A 56 ohm 1 watt resistor, R77, from two lug terminal strip lug TZ #2 (NS) to lug #7 of 10 lug rear screw terminal strip TM. Capacitor C42 (.25 mfd.)goes to terminal #2 of TZ two lug strip (S).

NOTE: On units below serial No. 7300, C42 was connected to #7 of 10 lug rear terminal strip TM.

The grounded terminal #1 of TZ is not wired.


FILTER CAPACITOR
ADD TERMINAL STRIP
TZ
BL-R
BK
2 R-Y
C44
C43
40 - 40 MF - 450 V
BL-BR
HARNESS
.25
C42
400V
P
W
GR
R77-1W
56
ADD RESISTOR
BK-OR
BK
BL-Y
BL-W
BK
9
8
7
6
5
4
3
2
1
TM
10 LUG SCREW TERMINAL STRIP

M159A
121-2 MX

CENTRAL ELECTRONICS, INC.

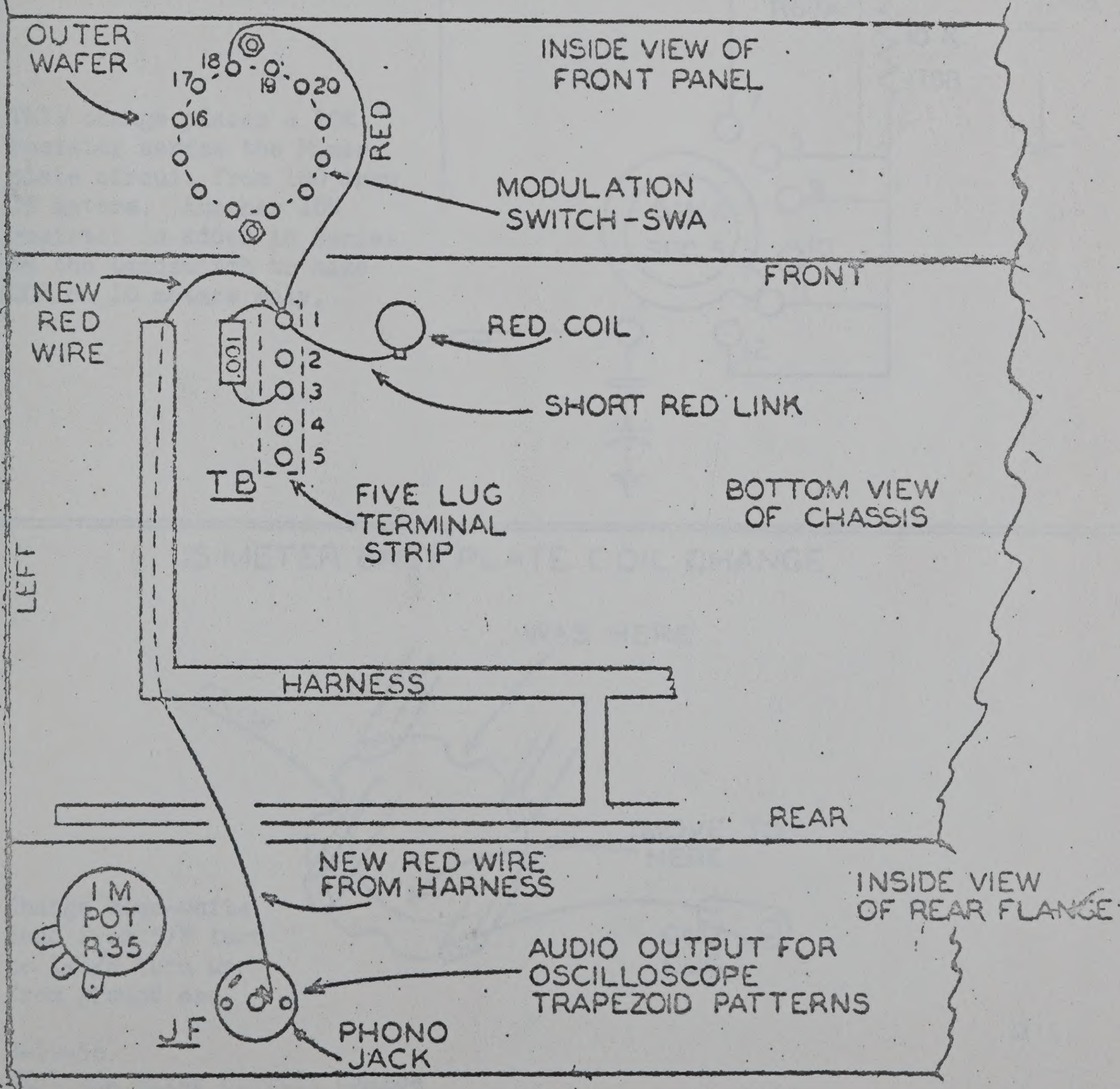
10B-20A CHANGE NOTICE

AUDIO CONNECTION FOR OSCILLOSCOPE

A phono-jack has been added to the rear of the chassis, which connects to the output of one of the modulators. This jack can be used to supply the audio voltage to an oscilloscope, such as the MM-1, for obtaining trapezoid patterns.

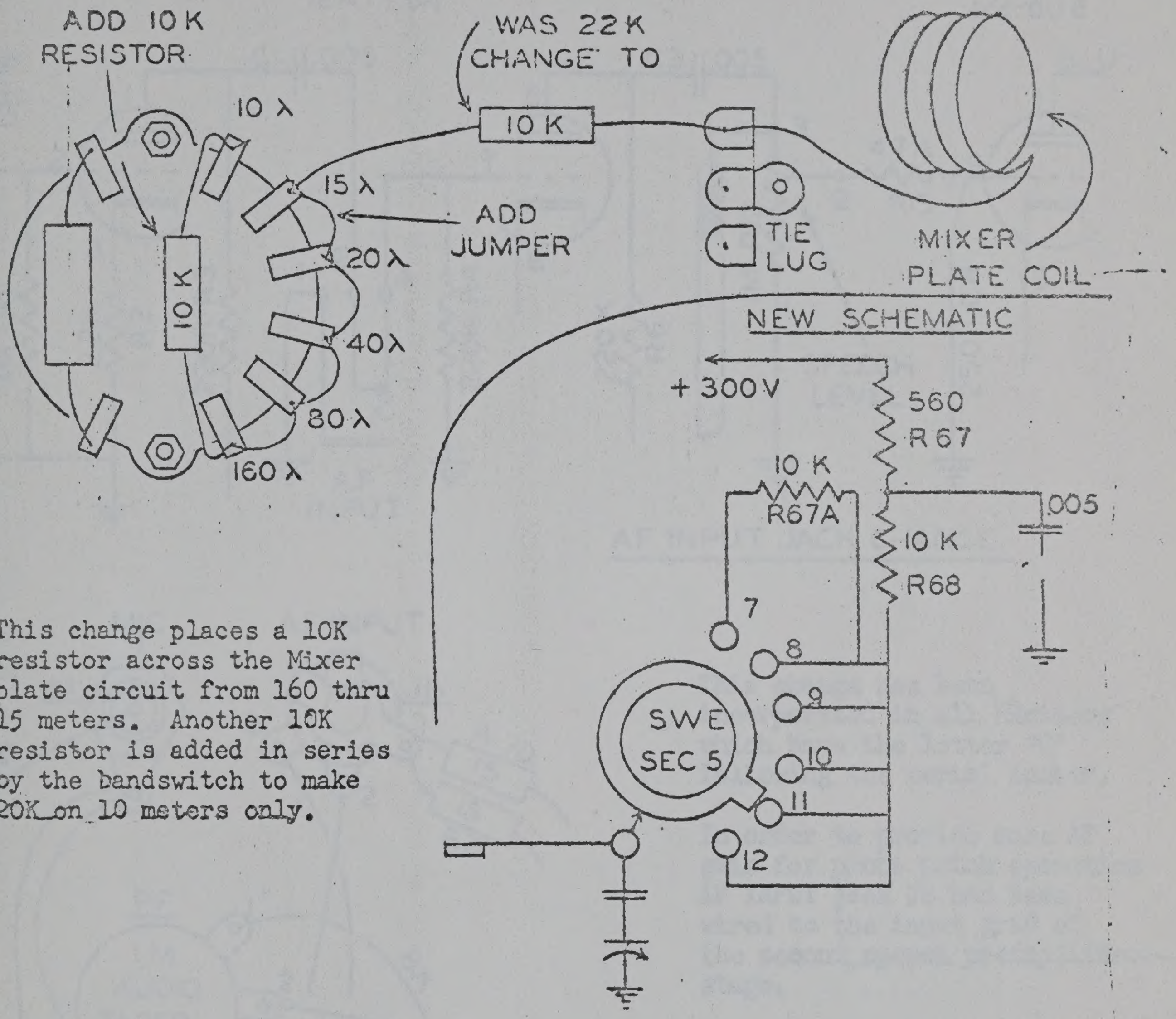
Mount the phono connector on the rear of the chassis with #6 hardware, as shown below. The red wire from the harness connects to terminal strip TB, Term. #1, near the front of the chassis. Solder the other end of this lead to the phono jack at the rear of the chassis.

This red wire is included in the harness in all Exciters which have the letter "C" following the serial number. On earlier Exciters the holes must be drilled for the connector and the red wire must be added.


OUTER WAFER
18
17
19
20
16
RED
INSIDE VIEW OF FRONT PANEL
MODULATION SWITCH-SWA
FRONT
NEW RED WIRE
.001
1
2
3
4
5
RED COIL
SHORT RED LINK
TB
FIVE LUG TERMINAL STRIP
BOTTOM VIEW OF CHASSIS
LEFT
HARNESS
REAR
NEW RED WIRE FROM HARNESS
INSIDE VIEW OF REAR FLANGE
1 M POT R35
AUDIO OUTPUT FOR OSCILLOSCOPE TRAPEZOID PATTERNS
JF
PHONO JACK

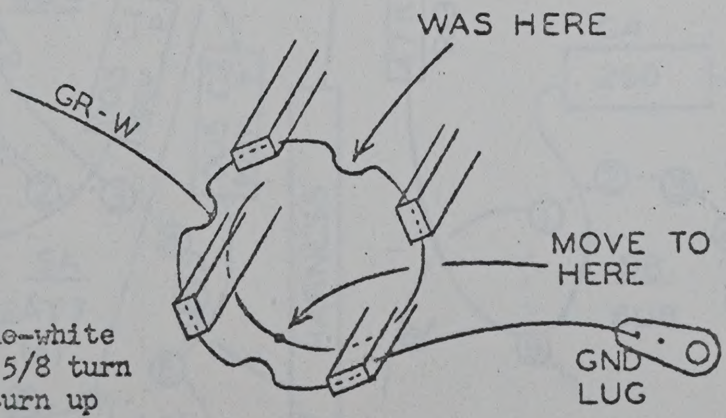
M16
121-2MX 2-16-57

20A MIXER CIRCUIT CHANGE


ADD 10 K RESISTOR
10 λ
15 λ
20 λ
40 λ
80 λ
160 λ
10 K
ADD JUMPER
WAS 22 K CHANGE TO
10 K
TIE LUG
MIXER PLATE COIL
NEW SCHEMATIC
+ 300V
560
R 67
10 K
R67A
10 K
R68
.005
7
8
9
10
11
12
SWE
SEC 5

This change places a 10K resistor across the Mixer plate circuit from 160 thru 15 meters. Another 10K resistor is added in series by the bandswitch to make 20K on 10 meters only.

15 METER 6AG7 PLATE COIL CHANGE


GR-W
WAS HERE
MOVE TO HERE
GND LUG

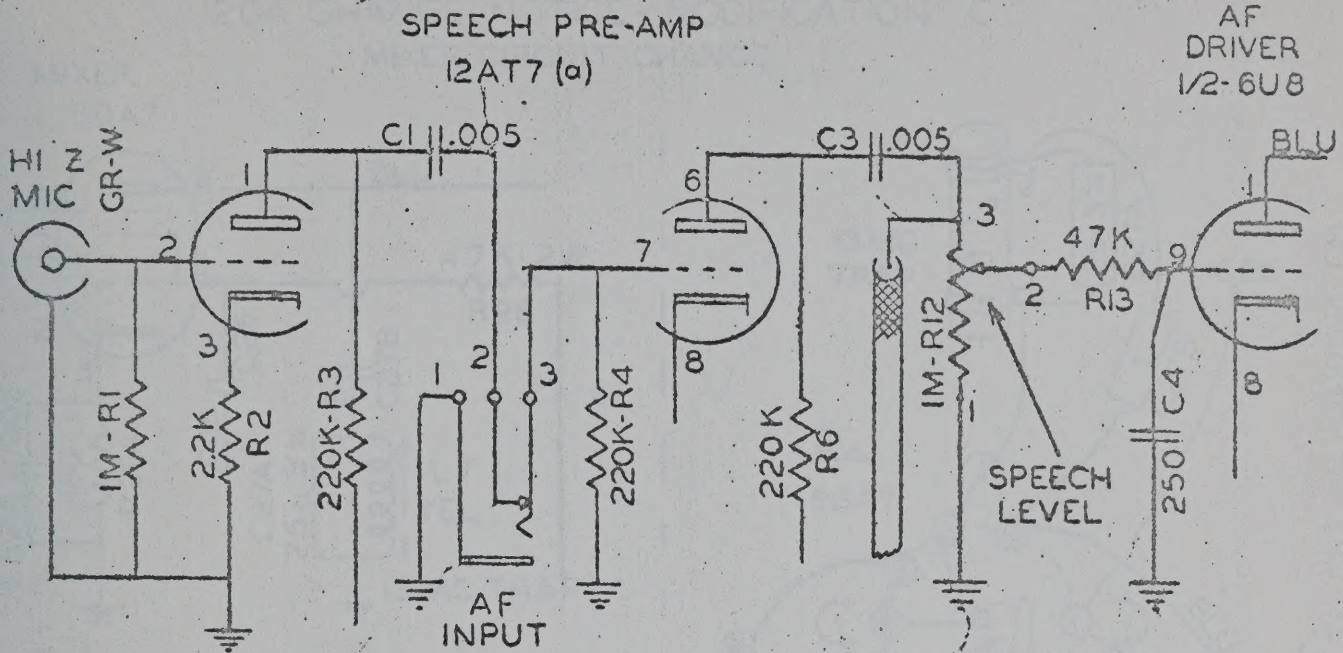
Change blue-white lead from 5/8 turn to 1-1/8 turn up from ground end.

M151

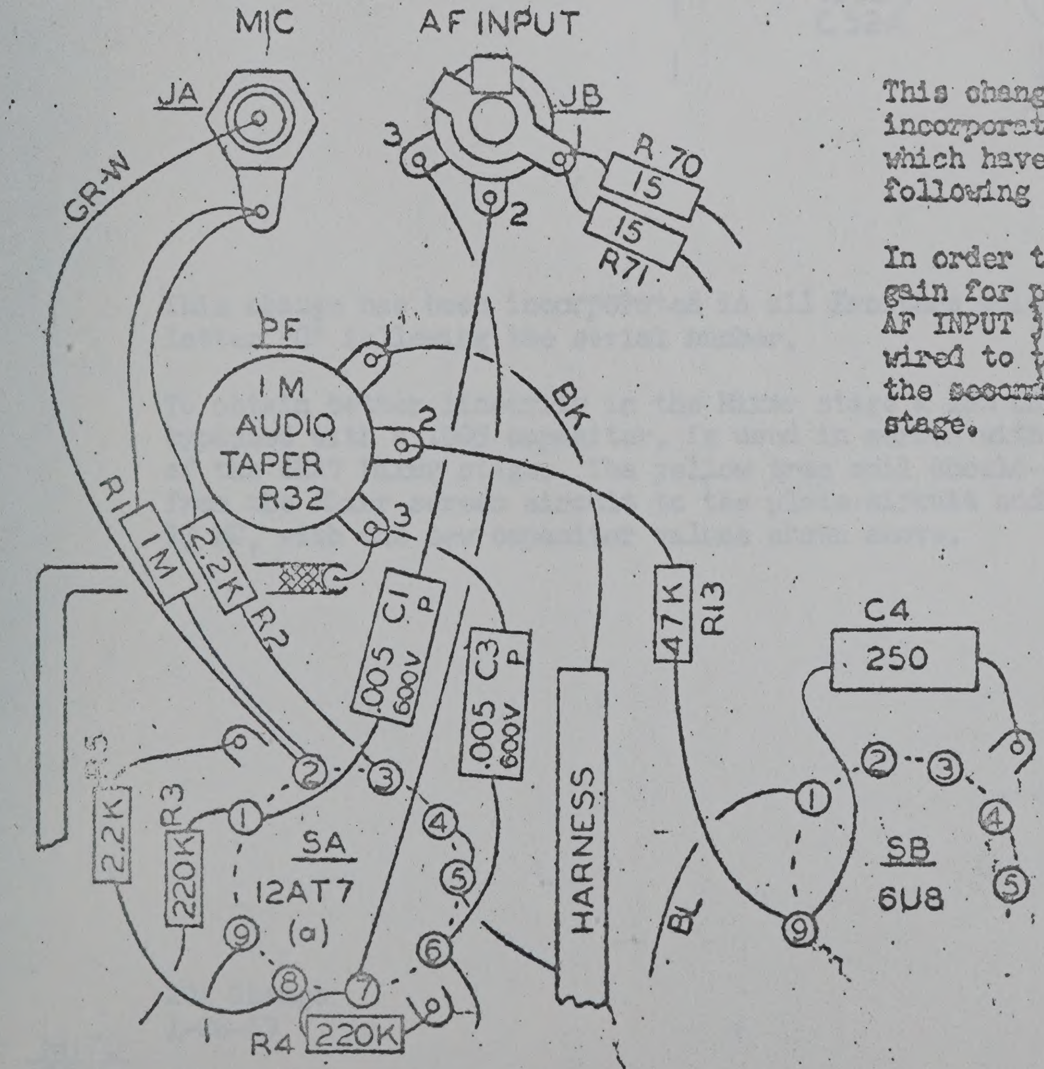
3-19-56
M151 20A Mixer Circuit Change

CENTRAL ELECTRONICS, INC.

10B-20A CHANGE NOTICE - MODIFICATION "C"


SPEECH PRE-AMP
12AT7 (a)
AF DRIVER
1/2-6U8
HI Z MIC
GR-W
C1 .005
C3 .005
BLU
1
2
3
7
6
8
3
2
9
8
1M-R1
2.2K R2
220K-R3
1
2
3
220K-R4
220K R6
1M-R12
1
47K
R13
C4
250
SPEECH LEVEL
AF INPUT

AF INPUT JACK CHANGE


MIC
JA
GR-W
AF INPUT
JB
3
1
2
R 70
15
15
R71
PF
1M
AUDIO
TAPER
R32
BK
2
3
R1
1M
2.2K
R2
.005 C1 P 600V
.005 C3 P 600V
47K R13
HARNESS
C4
250
R5
2.2K
R3
220K
1
2
3
4
5
6
7
8
9
SA
12AT7
(a)
R4 220K
BL
1
2
3
4
5
9
SB
6U8

This change has been incorporated in all Exciters which have the letter "C" following the serial number.

In order to provide more AF gain for phone patch operation AF INPUT jack JB has been wired to the input grid of the second speech preamplifier stage.

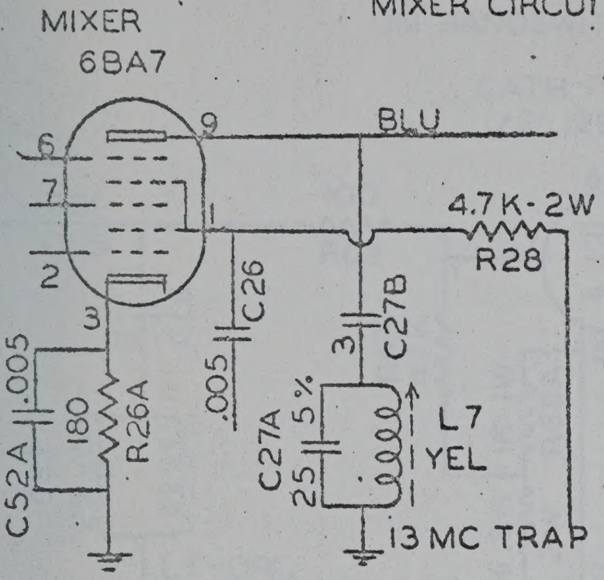
M168
105-7MX

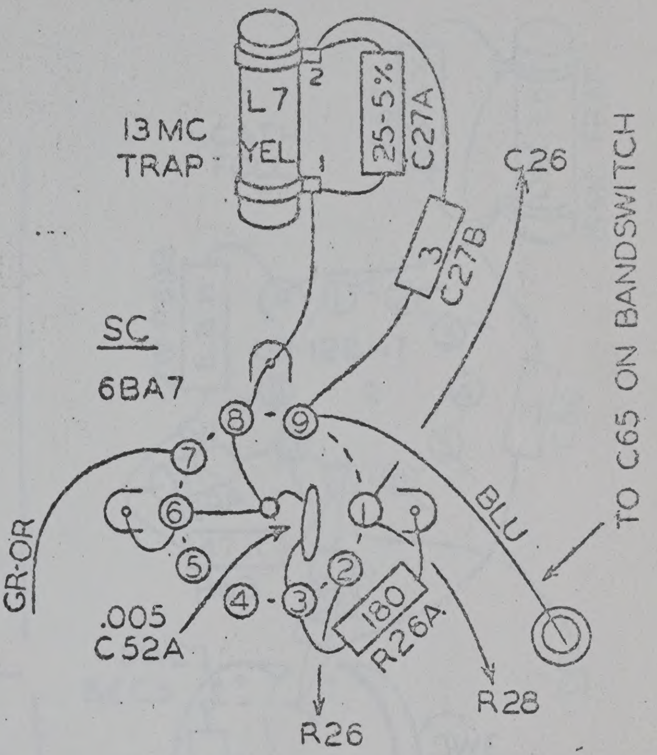
1-28-57
Printed in USA

CENTRAL ELECTRONICS, INC.

20A CHANGE NOTICE - MODIFICATION "C"

MIXER CIRCUIT CHANGE


MIXER
6BA7
6
7
2
3
9
BLU
4.7K-2W
R28
C26
.005
3
C27B
C27A
25
5%
L7
YEL
13 MC TRAP
C52A
.005
180
R26A


13 MC
TRAP
L7
YEL
2
1
25-5%
C27A
C26
3
C27B
SC
6BA7
TO C65 ON BANDSWITCH
1
2
3
4
5
6
7
8
9
GR-OR
BLU
.005
C52A
180
R26A
R28
R26

This change has been incorporated in all Exciters which have the letter "C" following the serial number.

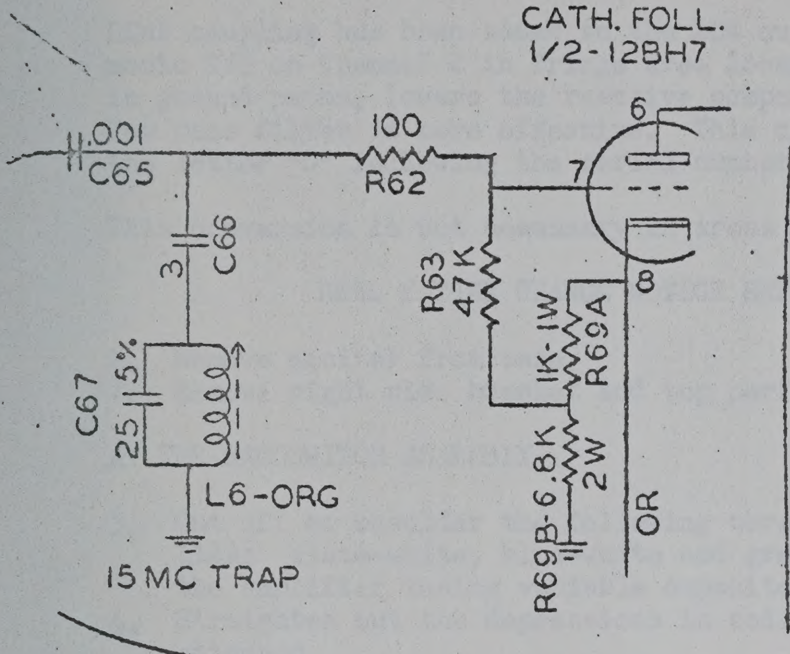
To obtain better linearity in the Mixer stage a 180 ohm resistor, bypassed with a .005 capacitor, is used in series with the cathode of the 6BA7 Mixer stage. The yellow trap coil should be moved from the Mixer screen circuit to the plate circuit and tuned to 13 MC, with the new capacitor values shown above.

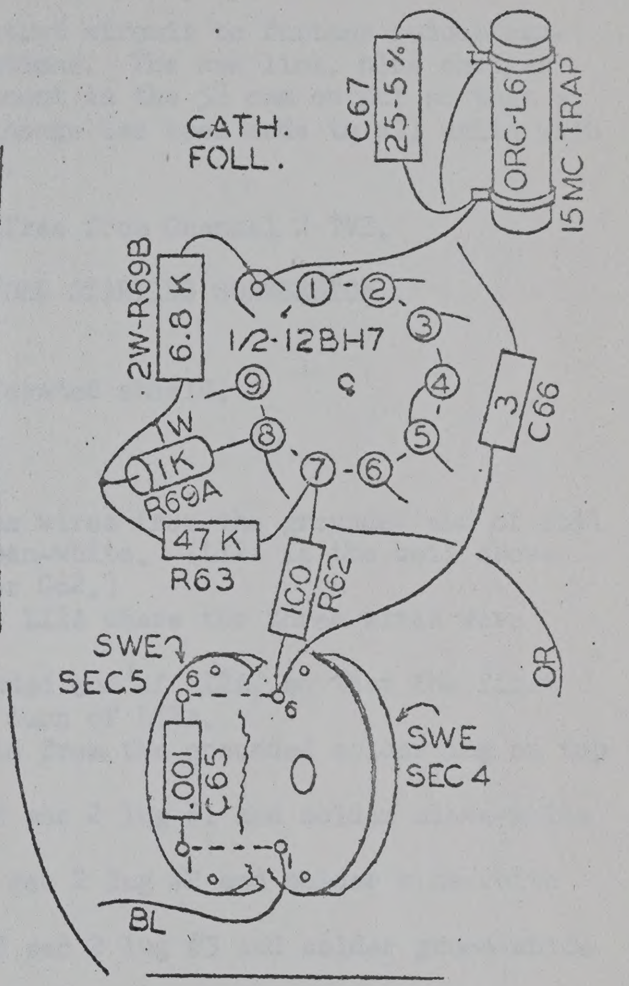
20A Change
1-28-57

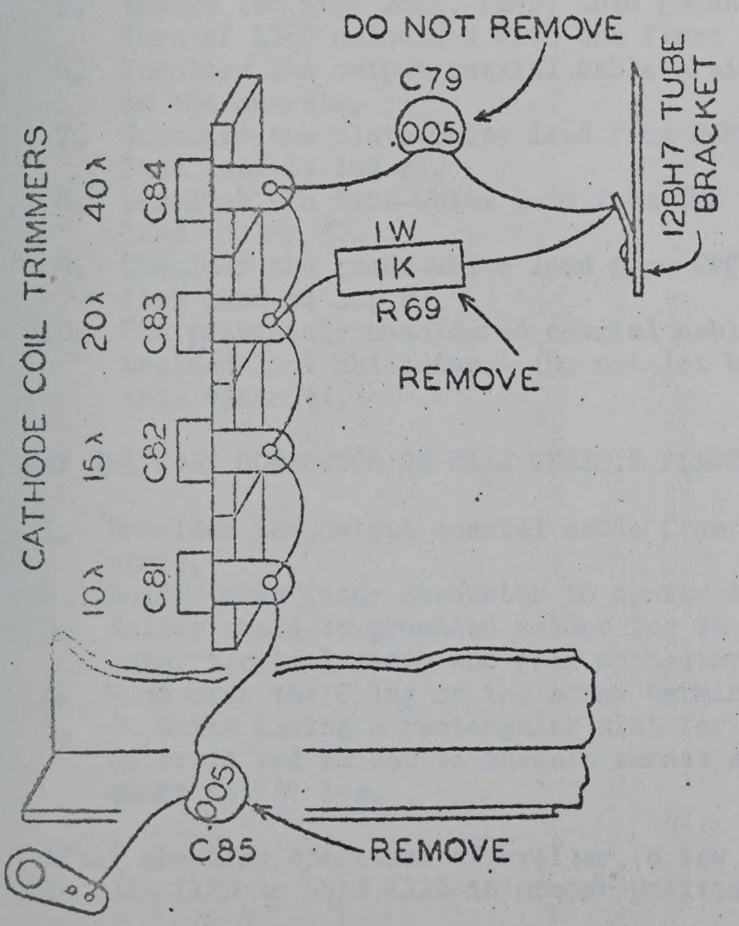
CENTRAL ELECTRONICS, INC.

20A CHANCE NOTICE-MODIFICATION "C"

CATHODE FOLLOWER CIRCUIT CHANGE
ON BANDSWITCH ASSEMBLY


CATH. FOLL.
1/2-12BH7
.001
C65
100
R62
6
7
8
3
C66
R63
47K
1K-1W
R69A
C67
25 5%
L6-ORG
R69B-6.8K
2W
OR
15 MC TRAP


CATH.
FOLL.
C67
25-5%
ORG-L6
15 MC TRAP
2W-R69B
6.8 K
1/2-12BH7
1
2
3
4
5
6
7
8
9
1W
1K
R69A
47 K
R63
3
C66
100
R62
OR
SWE
SEC5
6
6
.001
C65
SWE
SEC4
BL


DO NOT REMOVE
C79
.005
12BH7 TUBE
BRACKET
CATHODE COIL TRIMMERS
40λ
C84
20λ
C83
15λ
C82
10λ
C81
1W
1K
R69
REMOVE
.005
C85
REMOVE

This change has been included on the Bandswitching Assembly in all Exciters and kits which have the letter "C" following the serial number. On earlier models, remove R69 and C85, as shown on left. Rewire the cathode circuit as shown above. C81, C82, C83 and C84 should be realigned for maximum output at the middle of each band.

M171 - 1-29-56 Rev. 2-7-57
20A Change
Printed in USA

20A CHANGE NOTICE - MODIFICATION "D"

Addition of Output Link Coil - L12D

Link coupling has been added to the 20A output circuit to further reduce harmonic TVI on Channel 2 in fringe area locations. The new link, plus changes in ground paths, lowers the reactive component in the 52 ohm output so that a low pass filter is more effective. This change has been made to all units with the letter "D" following the serial number.

This conversion is not necessary in areas free from Channel 2 TVI.

READ ENTIRE CHANGE NOTICE BEFORE STARTING CONVERSION

1. Remove exciter from case.
2. Remove right side bracket and top perforated shield.

AT THE BANDSWITCH ASSEMBLY

3. Cut off or unsolder the following three wires from the grounded end of coil L12A: slate-white, blue-white and green-white. (L12A is the coil above the amplifier tuning variable capacitor C62.)
4. Straighten out the depressions in coil L12A where the three wires were attached.
5. Insert the link coil, L12D, into grounded end of L12A, so that the first turn of L12D coincides with the first turn of L12A.
6. Unsolder the output coaxial cable braid from the grounded solder lug on top of the chassis.
7. Unsolder the slate-white lead from SWE sec 2 lug #1 and solder slate-white link lead to lug #1.
8. Unsolder the blue-white lead from SWE sec 2 lug #2 and solder blue-white lead to lug #2.
9. Unsolder the green-white lead from SWE sec 2 lug #3 and solder green-white link lead to lug #3.
10. The previously unsoldered coaxial cable braid must now be soldered to braided link shielding. (Do not let braid short to C62 or to chassis in this vicinity.)

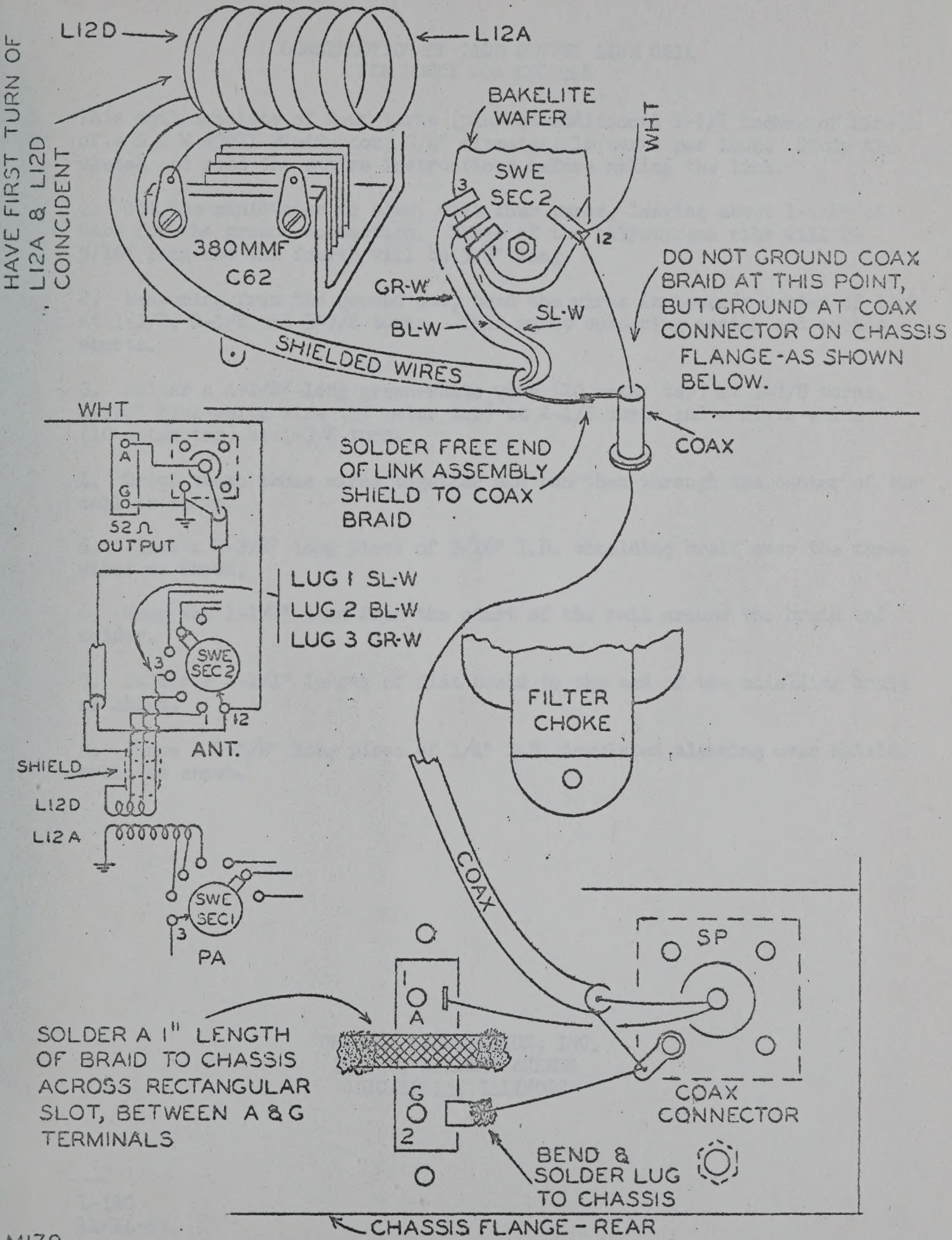
AT THE COAX CONNECTOR ON REAR CHASSIS FLANGE

1. Unsolder the output coaxial cable from the two lugs of the A-G screw terminal strip.
2. Solder coax inner conductor to center lug of coax connector.
3. Solder braid to grounded solder lug at connector. (The jumpers between screw terminal strip and coax connector are to remain as is.)
4. Bend over the G lug on the screw terminal strip and solder to chassis.
5. On units having a rectangular slot for the A-G screw strip, take a 1" length of braid and solder to chassis across slot, between A and G lugs. Do not short to "A" lug.

After checking operation of exciter, a few drops of coil dope should be applied to L12A-L12D to hold L12D in proper position.

20A Change "D"
1-17-58
Printed in USA

20A CHANGE NOTICE


L12D
L12A
HAVE FIRST TURN OF L12A & L12D COINCIDENT
BAKELITE WAFER
WHT
SWE SEC 2
3
1
12
380MMF
C62
GR-W
SL-W
BL-W
SHIELDED WIRES
DO NOT GROUND COAX BRAID AT THIS POINT, BUT GROUND AT COAX CONNECTOR ON CHASSIS FLANGE-AS SHOWN BELOW.
WHT
A
G
L
52 Ω OUTPUT
SOLDER FREE END OF LINK ASSEMBLY SHIELD TO COAX BRAID
COAX
LUG 1 SL-W
LUG 2 BL-W
LUG 3 GR-W
SWE SEC 2
3
1
12
ANT.
SHIELD
L12D
L12A
FILTER CHOKE
COAX
SWE SEC1
3
PA
SP
A
1
G
2
SOLDER A 1" LENGTH OF BRAID TO CHASSIS ACROSS RECTANGULAR SLOT, BETWEEN A & G TERMINALS
COAX CONNECTOR
BEND & SOLDER LUG TO CHASSIS
CHASSIS FLANGE - REAR

M179
12-17-57

CONSTRUCTION OF L12D OUTPUT LINK COIL
FOR MODEL 20A EXCITER

This coil consists of four turns (plus an additional 1-1/2 inches of wire) of a B & W #3011 Miniductor, 3/4" diameter, 16 turns per inch. Study the sketch and read the entire instructions before making the link.

1. Cut the miniductor to size, with four turns, leaving about 1-1/2" of wire for the ground connection. Three of the polystyrene ribs will be 5/16" long and the fourth will be 3/8" long.

2. Measuring from the ground end, bend the wires in towards center of link at 1-3/8, 2-1/8 and 3-7/8 turns. This makes soldering easier and avoids shorts.

3. Solder a 4-1/2" long green-white wire (20 meter tap) at 3-7/8 turns, 4-1/2" blue-white wire (15 meter tap) at 2-1/8 turns and a slate-white (10 meter tap) at 1-3/8 turns.

4. Group these three wires together and run them through the center of the coil as shown.

5. Place a 2-3/8" long piece of 3/16" I.D. shielding braid over the three wires as shown.

6. Wrap the 1-1/2" lead from the start of the coil around the braid and solder.

7. Solder a 2-1/4" length of flat braid to the end of the shielding braid as shown.

8. Place a 2-5/8" long piece of 1/4" I.D. insulated sleeving over shield braid as shown.

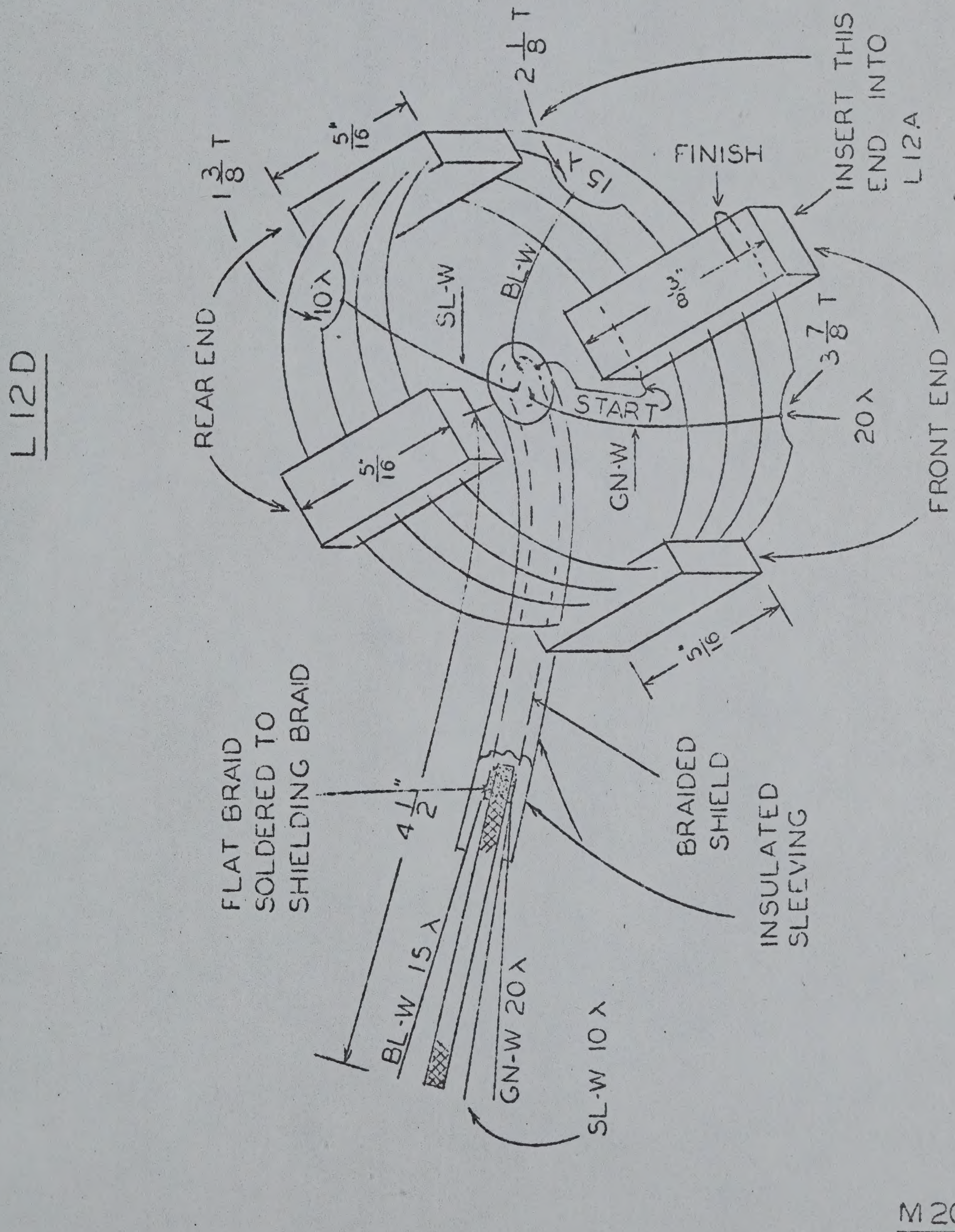
CENTRAL ELECTRONICS, INC.
1247 W. BELMONT AVENUE
CHICAGO 13, ILLINOIS

L-12D
11-14-58
Printed in USA

OUTPUT LINK COIL FOR 20A

B & W MINIDUCTOR # 3011 3/4" DIA., 16 TURNS PER INCH.

4 TURNS, PLUS 1 1/2" ADDITIONAL FOR GROUND CONNECTION


L12D
REAR END
1 3/8 T
5/16
5/16
2 1/8 T
INSERT THIS END INTO L12A
FINISH
15 λ
10 λ
SL-W
BL-W
3/4"
START
3 7/8 T
20 λ
FRONT END
GN-W
5/16
BRAIDED SHIELD
INSULATED SLEEVING
FLAT BRAID SOLDERED TO SHIELDING BRAID
4 1/2"
BL-W 15 λ
GN-W 20 λ
SL-W 10 λ

CENTRAL ELECTRONICS, INC.

EASTGATE 7-7460

Central Electronics, Inc.

RESEARCH – DEVELOPMENT – MANUFACTURING

AUDIO – COMMUNICATIONS – MEDICAL ELECTRONICS

1247 W. BELMONT AVENUE CHICAGO 13, ILLINOIS

July 18, 1955

T. H. Stahl
2134 Hawthorne Road
Grosse Pointe Woods 6
Michigan

Dear Mr. Stahl:

Thanks for your letter of July 7 regarding the Model 20A Multiphase Exciter which has given you trouble.

Recently the sensitivity of the relay control circuit was increased in our Exciters in order to provide a longer "hole in" time for satisfactory operation. The resting relay current is controlled by R45 in the cathode of 12AT7(c), pin No. 3. The value of 3300 ohms, which was previously used, was changed to 2700 ohms to increase sensitivity. In your unit we have changed back to the 3300 ohms.

Variations in tubes, resistors, the relay and relay fatigue (after adjustment) can cause the relay to hold in once it has been energized in some rare cases.

At times we have considered using a 2200 ohm resistor in series with a 1000 ohm potentiometer so that any desired sensitivity could be obtained. However, there are about 15 controls and switches on the 20A already; we have therefore hesitated to add another.

The wire used in our equipment has two wrappings of cellulose acetate, in addition to the outer waxed cotton layer and is rated at 2200 volts insulation. This same wire is used by several manufacturers of quality test equipment and quality communications equipment, and we do not believe that your comment is factually accurate nor deserved.

Our equipment has been used in various humid locations, such as Florida, the Hawaiian Islands and other Pacific Islands, and we have never yet had a single complaint regarding the wire used. While this type of wire will not pass rigid military specifications wherein the equipment will withstand immersion in water for extended periods of time, we feel confident that it will serve well for its intended purpose and would not justify the additional cost in labor required in using plastic covered wire.

Very truly yours,

CENTRAL ELECTRONICS, INC.

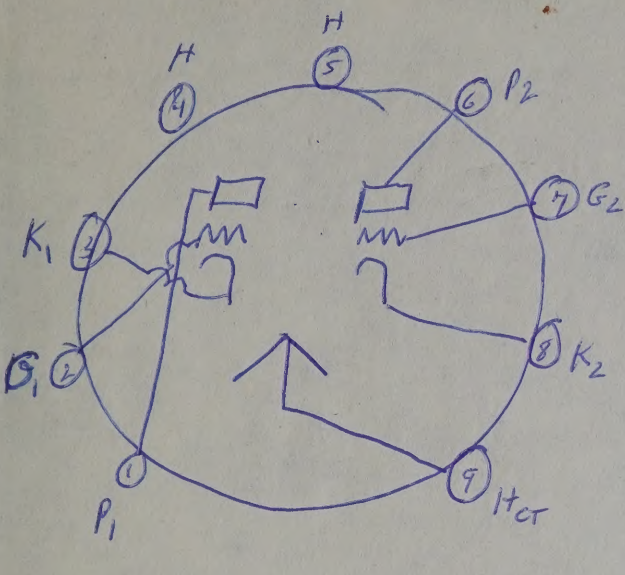
Janet E. Christensen

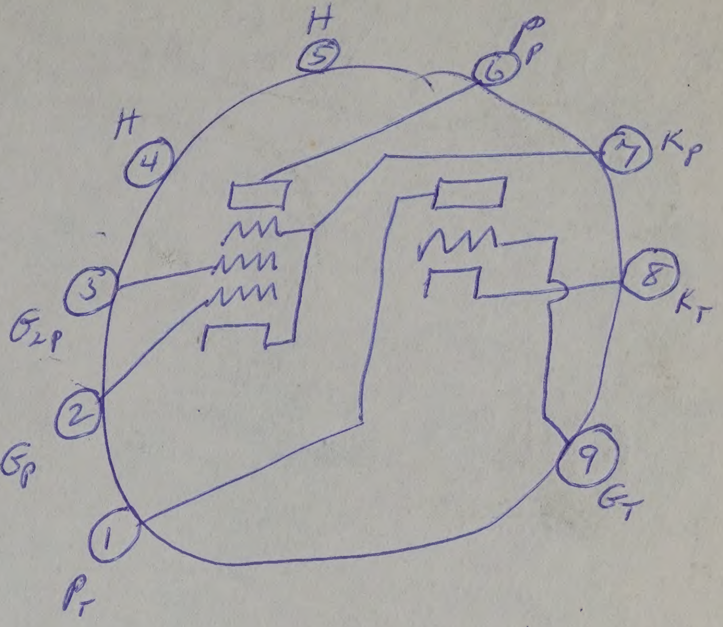
Janet E. Christensen
for R. Scherman, Engr.

RS:jc

12BH7

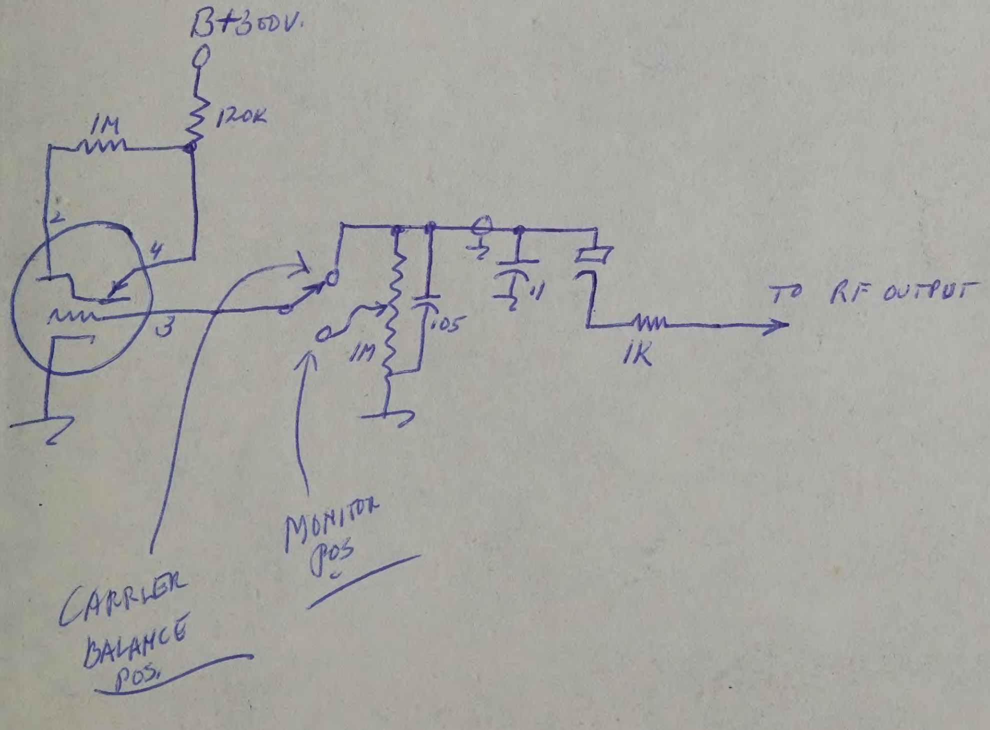
6U8

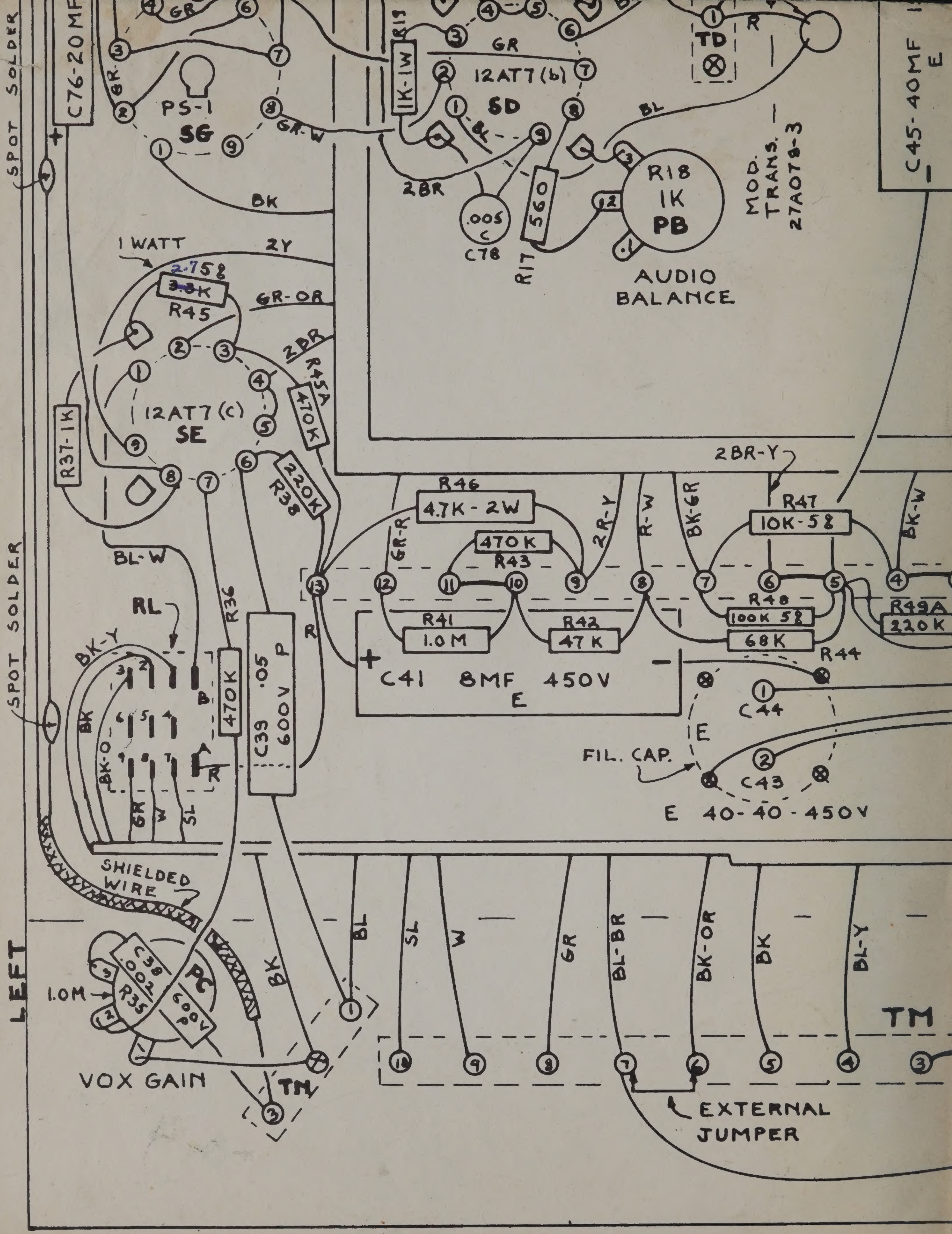

H
H
5
4
6
P2
7
G2
3
K1
2
G1
8
K2
1
P1
9
HCT


H
5
6
P
H
4
7
KP
3
G2P
8
KT
2
GP
9
GT
1
PT

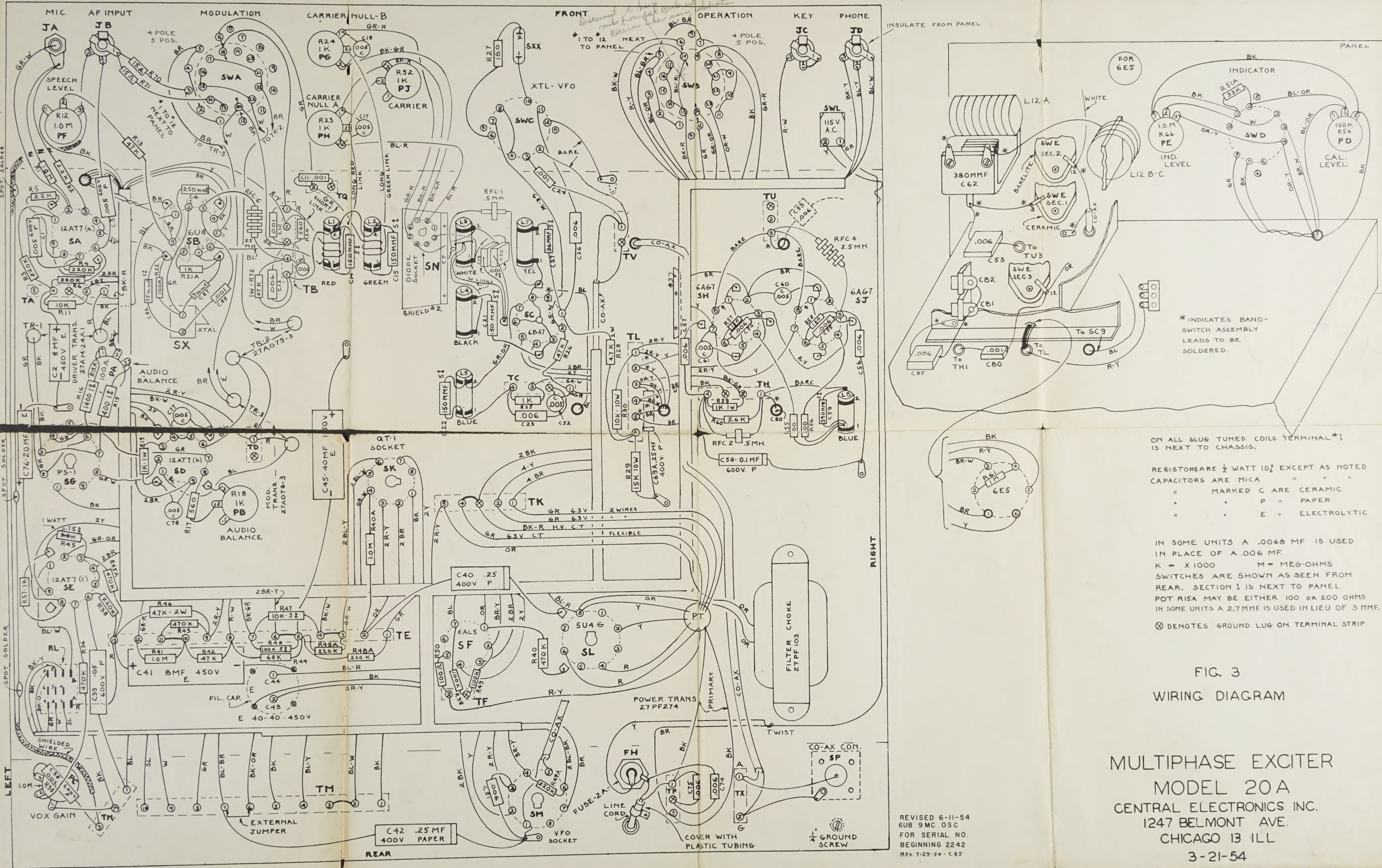
10A/B TUNING EYE

QST. DEC.57-P.38


B+300V.
120K
1M
2
4
3
.05
.1
1M
1K
TO RF OUTPUT
MONITOR POS.
CARRIER BALANCE POS.



LEFT
SPOT SOLDER
SPOT SOLDER
SPOT SOLDER
C76-20MF
PS-1
SG
GR
GR-W
BK
1K-1W
R19
12AT7 (b)
SD
TD
C45-40MF
E
MOD.
TRANS.
27A078-3
R18
1K
PB
AUDIO
BALANCE
.005
C
C78
560
R17
2BR
BL
1 WATT
2Y
~~3.3K~~ 2.758
R45
GR-OR
2BR
R45A
470K
12AT7 (C)
SE
R37-1K
220K
R38
2BR-Y
R46
4.7K-2W
470K
R43
GR-R
2R-Y
R-W
BK-GR
R47
10K-58
BK-W
R48
100K 58
R49A
220K
R41
1.0M
R42
47K
68K
R44
C41 8MF 450V
E
C44
E
FIL. CAP.
C43
E 40-40-450V
BL-W
RL
R36
470K
C39 .05
600V P
R
BK-Y
BK
BK-O
GR
W
SL
SHIELDED
WIRE
C38
.002
R35
1.0M
PC
600V
P
VOX GAIN
TM
BK
BL
SL
W
GR
BL-BR
BK-OR
BK
BL-Y
TM
EXTERNAL
JUMPER


MIC.
AF INPUT
MODULATION
CARRIER NULL-B
FRONT
Disconnect to have mike from feed Back [illegible] Receiver when using [illegible] operation
OPERATION
KEY
PHONE
INSULATE FROM PANEL
PANEL
JA
JB
JC
JD
4 POLE 5 POS.
SPEECH LEVEL
R12 1.0M PF
SWA
1 TO 12 NEXT TO PANEL
R24 1K PG
R52 1K PJ
CARRIER
CARRIER NULL A
R23 1K PH
R27 180
SXX
XTL-VFO
SWC
SWB
SWL 115V. A.C.
12AT7 (a) SA
6U8 SB
TA
TB
TQ
SN
DIODE SOCKET
SHIELD #2
SX
XTAL
TR-1
DRIVER TRANS. 27AM-24A1
PA
AUDIO BALANCE
TR-2 27A079-3
TR-3
SC 6BA7
TC
TV
CO-AX
TU
RFC 4 2.5MH
6AG7 SH
6AG7 SJ
TL
TH
RFC 2 .5MH
C58-0.1MF 600V. P
BLUE
BLACK
RED
GREEN
WHITE
YEL
12AT7 (b) SD
R18 1K PB
MOD. TRANS. 27A078-3
PS-1 SG
TD
C45-40MF 450V E
QT-1 SOCKET
SK
TK
GR 6.3V 2 WIRES
BK-R H.V. C.T.
GR 6.3V C.T.
FLEXIBLE
12AT7 (c) SE
C40 .25 400V P
5U4G SL
PT
6AL5 SF
TF
TE
C41 8MF 450V E
FIL. CAP.
C43 E 40-40-450V
FILTER CHOKE 27PF103
POWER TRANS 27PF274
PRIMARY
TWIST
RIGHT
LEFT
REAR
SPOT SOLDER
RL
SHIELDED WIRE
VOX GAIN
TM
EXTERNAL JUMPER
C42 .25MF 400V PAPER
SM
VFO SOCKET
FUSE-2A
FH
LINE CORD
TP
TX
COVER WITH PLASTIC TUBING
CO-AX CON.
SP
GROUND SCREW
FOR 6E5
INDICATOR
R51A 33K
SWD
1.0M R66 PE
IND. LEVEL
100K R54 PD
CAL. LEVEL
L12-A
L12 B-C
WHITE
380MMF C62
SWE SEC.2
SWE SEC.1
SWE SEC.3
BAKELITE
CERAMIC
To TU3
CB2
CB1
To SC9
To TL
To TH1
C85
C80
6E5
R61 1M

*INDICATES BAND-SWITCH ASSEMBLY LEADS TO BE SOLDERED.

ON ALL SLUG TUNED COILS TERMINAL #1 IS NEXT TO CHASSIS.

REGISTORS ARE ½ WATT 10% EXCEPT AS NOTED

CAPACITORS ARE MICA	"	"	"
"	MARKED C	ARE	CERAMIC
"	"	P "	PAPER
"	"	E "	ELECTROLYTIC

IN SOME UNITS A .0068 MF IS USED IN PLACE OF A .006 MF.

K = X 1000 M = MEG-OHMS

SWITCHES ARE SHOWN AS SEEN FROM REAR. SECTION 1 IS NEXT TO PANEL.

POT R15A MAY BE EITHER 100 OR 200 OHMS

IN SOME UNITS A 2.7 MMF IS USED IN LIEU OF 3 MMF.

⊗ DENOTES GROUND LUG ON TERMINAL STRIP

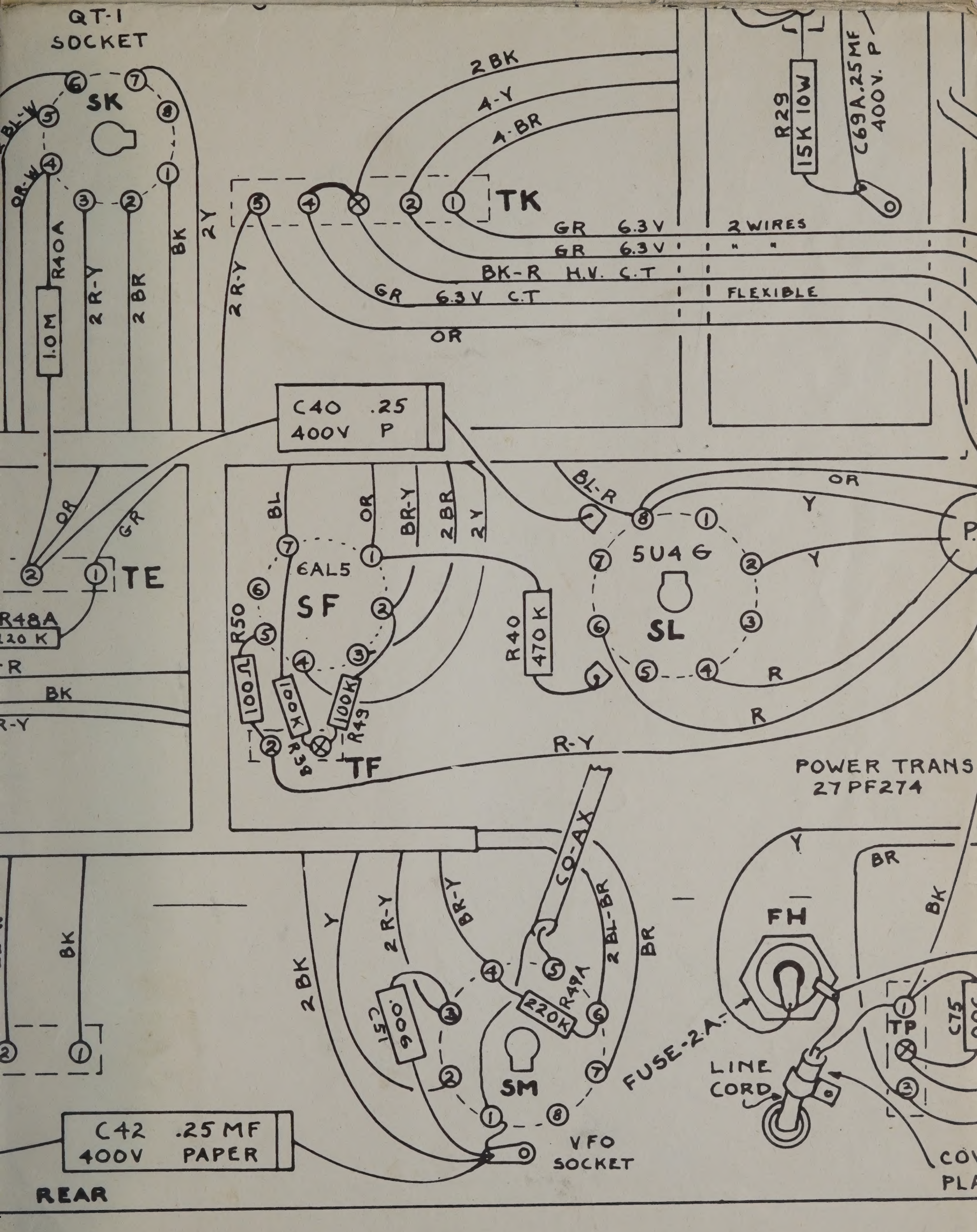
FIG. 3

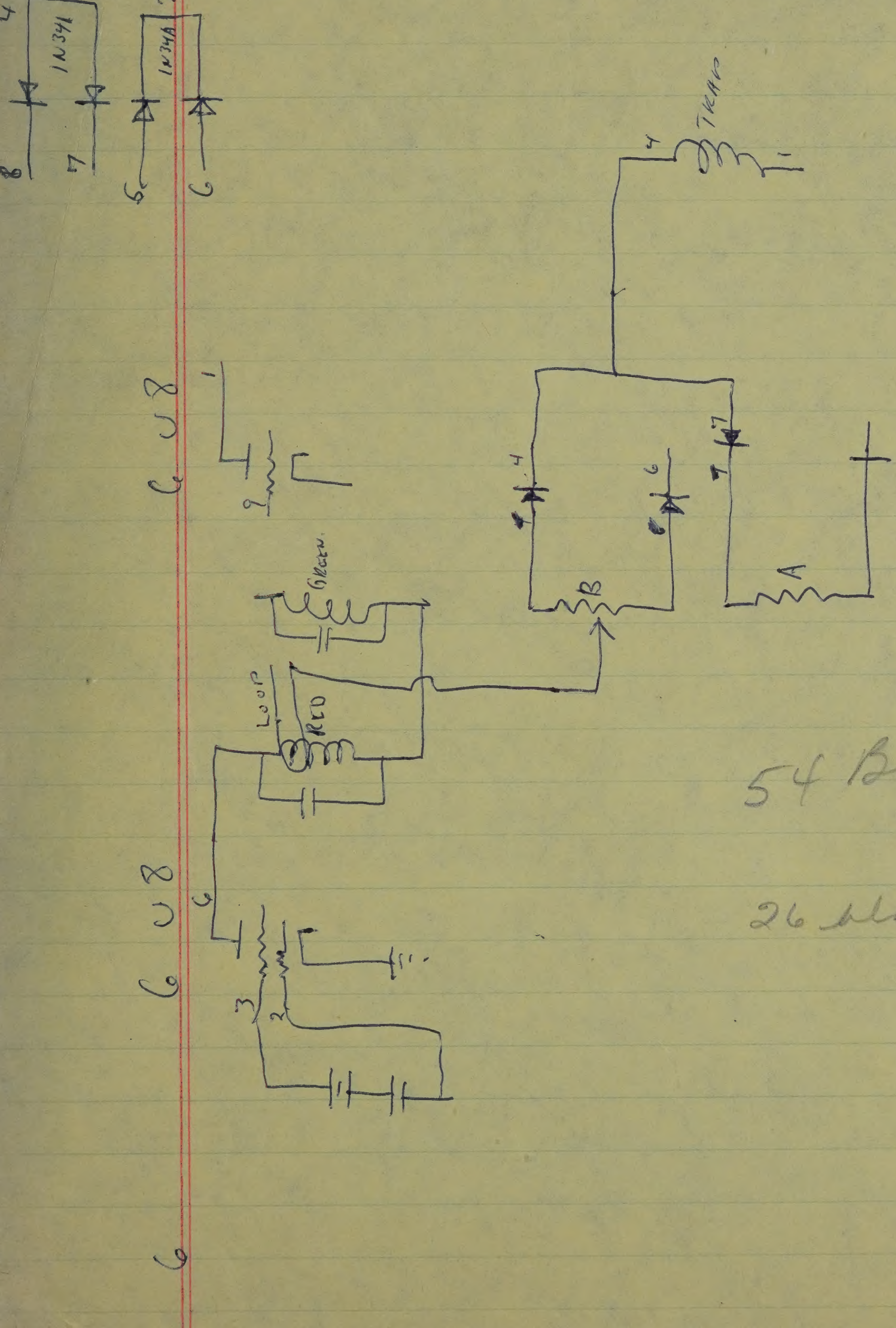
WIRING DIAGRAM

REVISED 6-11-54
6U8 9MC OSC
FOR SERIAL NO.
BEGINNING 2242
Rev. 7-29-54 - C85

MULTIPHASE EXCITER
MODEL 20A

CENTRAL ELECTRONICS INC.
1247 BELMONT AVE.
CHICAGO 13 ILL
3-21-54


QT-1
SOCKET
SK
BL-W
OR-W
R40A
1.0M
2 R-Y
2 BR
BK
2Y
2 R-Y
2 BK
4-Y
4-BR
TK
GR 6.3V
2 WIRES
GR 6.3V
" "
BK-R H.V. C.T
GR 6.3V C.T
FLEXIBLE
OR
R29
15K 10W
C69A.25MF
400V. P
C40 .25
400V P
OR
GR
TE
R48A
120 K
R
BK
R-Y
BL
OR
BR-Y
2 BR
2Y
6AL5
SF
R50
100Ω
100K
R39
100K
R49
TF
R40
470 K
BL-R
OR
Y
Y
5U4 G
SL
R
R
P.
R-Y
POWER TRANS
27PF274
CO-AX
Y
BR
BK
2 BK
Y
2 R-Y
BR-Y
2 BL-BR
BR
R49A
220K
C51
.006
SM
FH
FUSE-2 A.
LINE
CORD
TP
C75
BK
C42 .25 MF
400V PAPER
VFO
SOCKET
REAR
COV
PLA


4
1N34
8
7
1N34A
2
5
6
6 U8
1
9
GREEN
LOOP
RED
6 U8
6
3
2
B
4
6
7
A
4
TRAN
1
6

54 Brown

26 black

SHIPPER

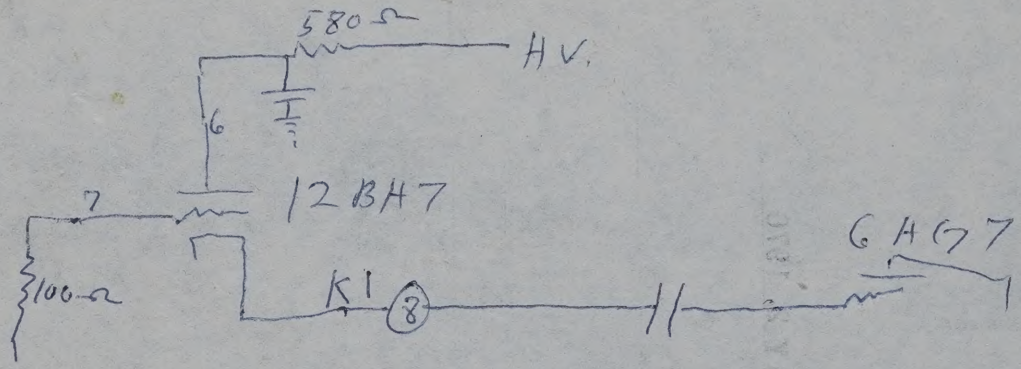
JAM PLASTIC CO.
8490 PATTON
DETROIT, MICH. 48228
846-0610

DATE MAY 2, 1976

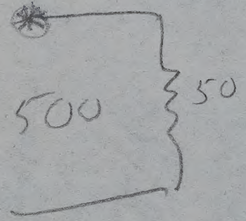
TO

CUST. ORDER NO.

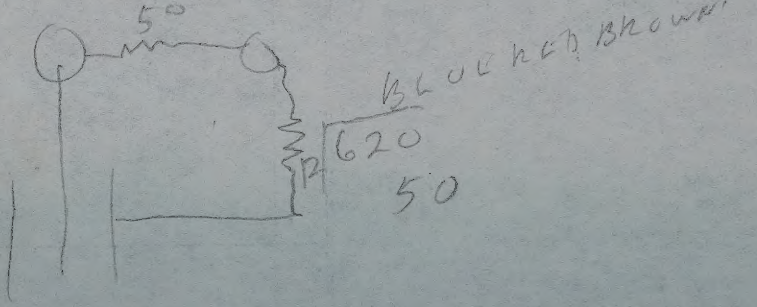
QUANTITY	DESCRIPTION


580 Ω
H.V.
6
12BH7
7
100 Ω
K1
8
6AG7

.3 T
.3
.09 I²
.50
4.50



GA 7-3184


50
BLOCKED BROWN
620
50

SHIPPER

JAM PLASTIC CO.
8490 PATTON
DETROIT, MICH. 48228
846-0610

DATE MAY 2, 1976

CUST. ORDER NO.

TO

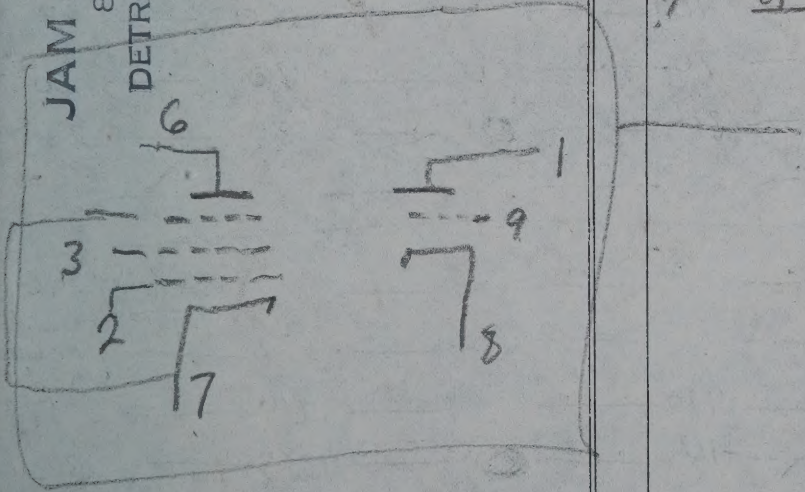
QUANTITY

DESCRIPTION

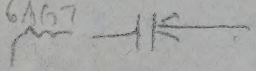
6U8 NOL. L.

XTAL →

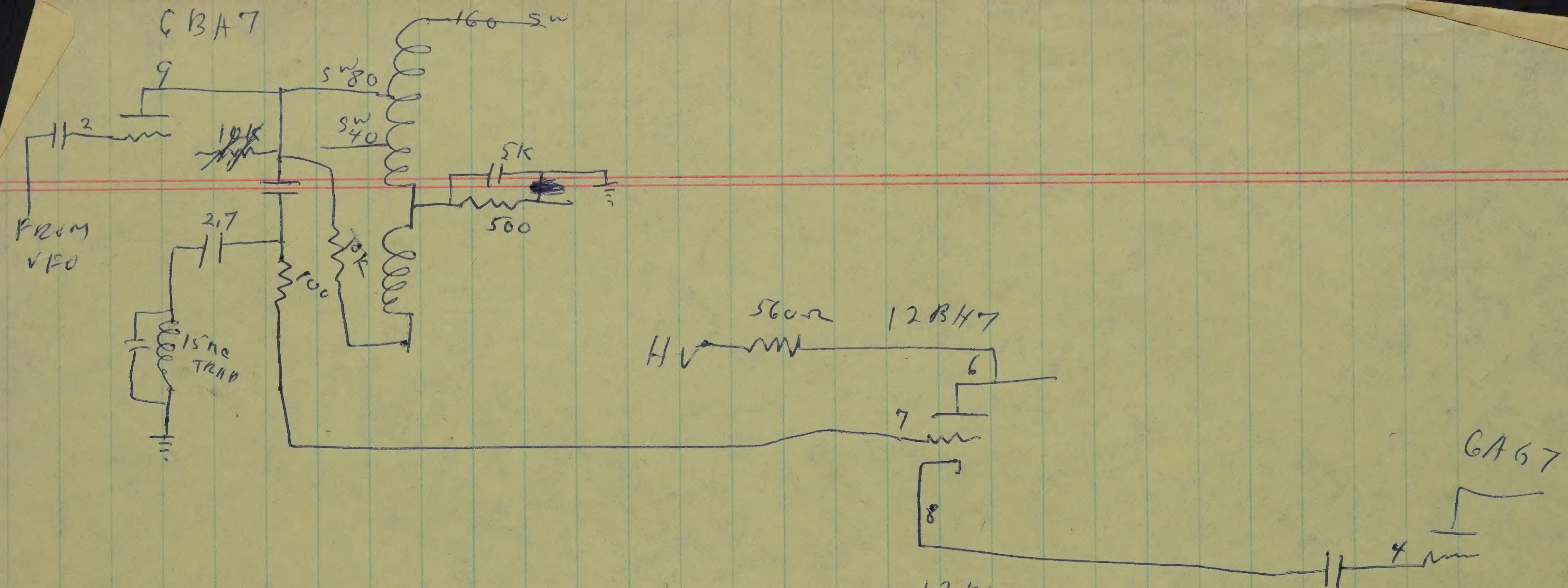
1	P	400	—	-1
2	G1	-12	—	-12
3	G2	250	—	250
4	H		—	
5	H			
6	P	400	—	400
7	KT	GND		
8	K	18	—	18
9	G	.00	—	.0

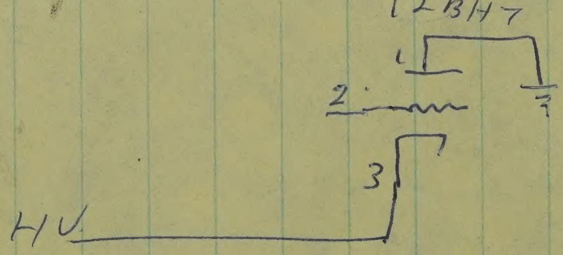


RF PROB TO 100 MICROAMP w/ 39k Resistor IN SERIES WITH MTR.

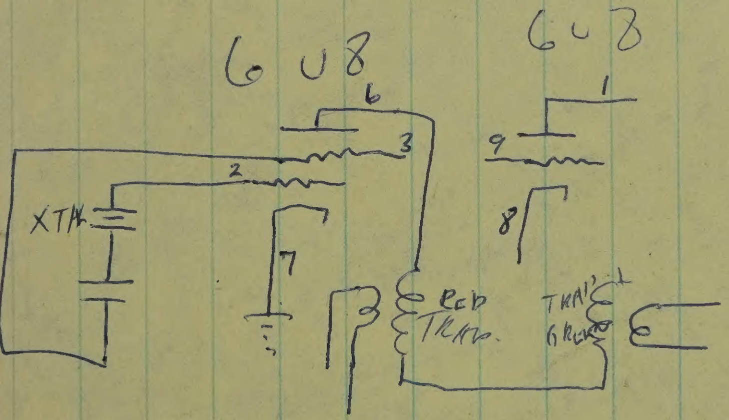
FROM VFO	100 MICRO/A PIN #	DC NO LOAD	M/A	DC LOAD	M/A ±	
6BH7 — PENTARR.	1 G2	250	—	117	—	
	2 G1	-112	100	-1	100	
	3 - K'	0		0		
	4 - H					
	5 - H					
	6 - H					
	7 - G3	0	8	0	10	
	8 - SHIELD					
	9 - P	400	0	~~395~~ (355)	98	
12BH7	1 - P②	0 GND	0	0	0	250k Resistor
	2 - G②	.3	0	.5	0	
	3 - K②	0	0	0	72	w/250k Resistor
	4 - H②	—	—	—	—	
	5 - H②	—	—	—	—	
	6 - P①	400	—	390	~~39~~	
	7 - G①	70	0	70	20	w/250 k
	8 - K①	80	0	80	28	w/250 k
	9 - H CT	—	—	—	—	
6AG7	1 - G3	—	—	—	—	w/25K Resistor IN SERIES WITH MTR.
	2 - H	—	—	—	—	
(6AK7)	3 - S1	420	—	410	—	
	4 - G1	-112	[illegible]	-80	30	
	5 - K	—	—	—	—	
	6 - G2	420	—	410	—	
	7 - H	—	—	—	—	
	8 - P	400	—	400	68	w/ Brown Grey Green 1800000 1800K

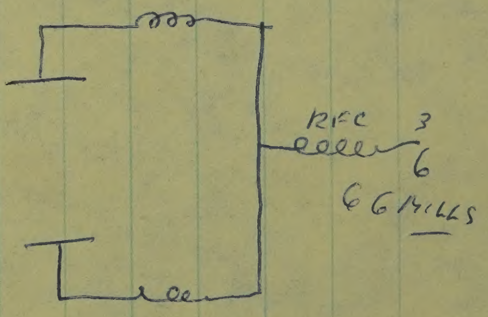
TIED TOGETHER (3 - S1, 6 - G2)


6BA7
9
2
FROM
VFO
10K
2.7
100
10K
15 mc
TRAP
SW 80
SW 40
160 SW
5K
500
HV
560 Ω
12BH7
6
7
8
6AG7
4


12BH7
1
2
3
HV

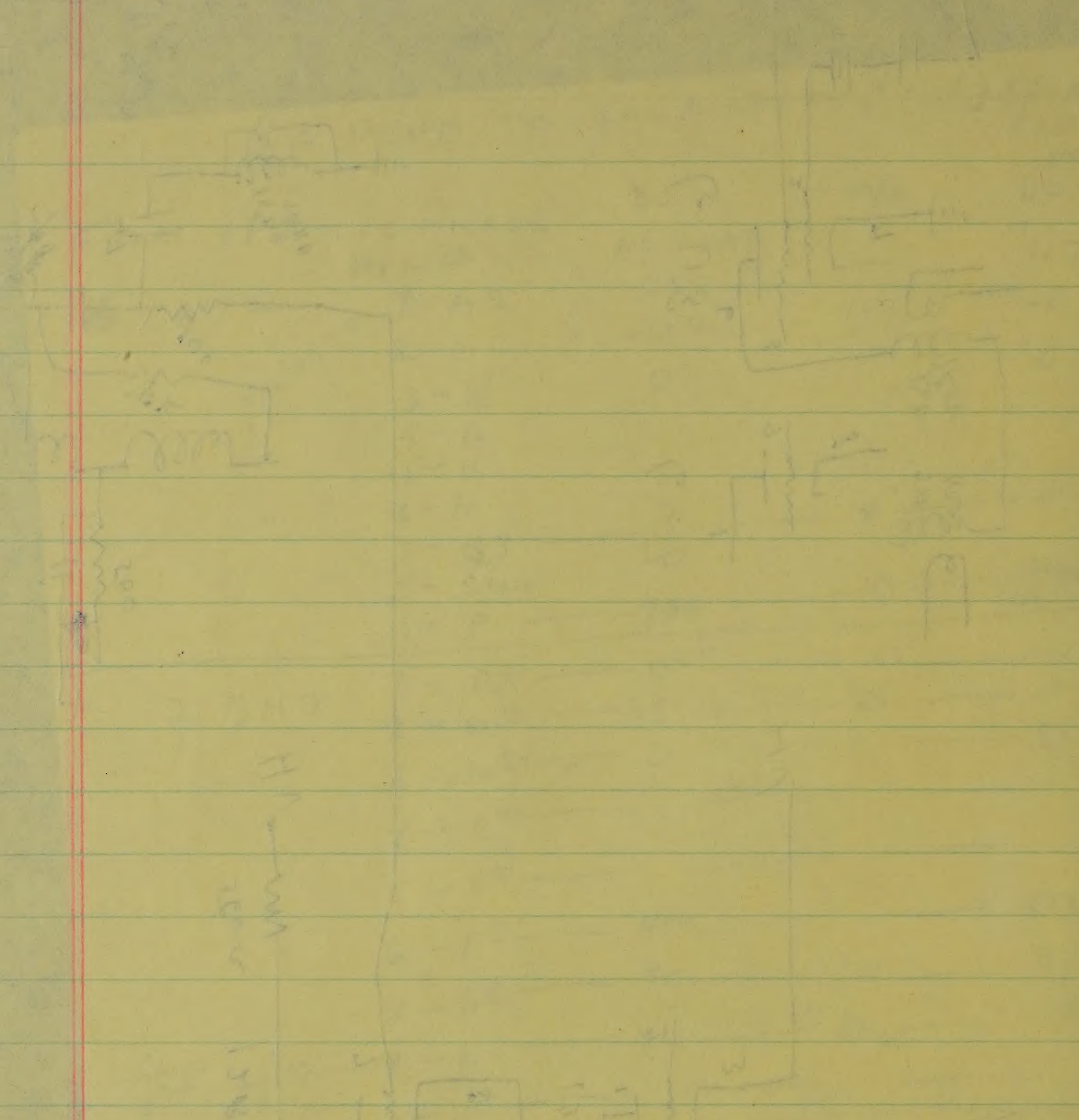
KATHODE
30 MILLS
12 MILLS. EACH
TUBE


6U8
6
3
2
XTAL
7
REC
TRAP.
6U8
1
9
8
TRAP
GRID



66 MILLS

26
.400
26.400



ASSEMBLY AND WIRING INSTRUCTIONS FOR

MULTIPHASE EXCITER KIT

MODEL 20-A

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Patents #2,566,876 #2,611,036

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1247 W. BELMONT AVE.
CHICAGO 13, ILL.

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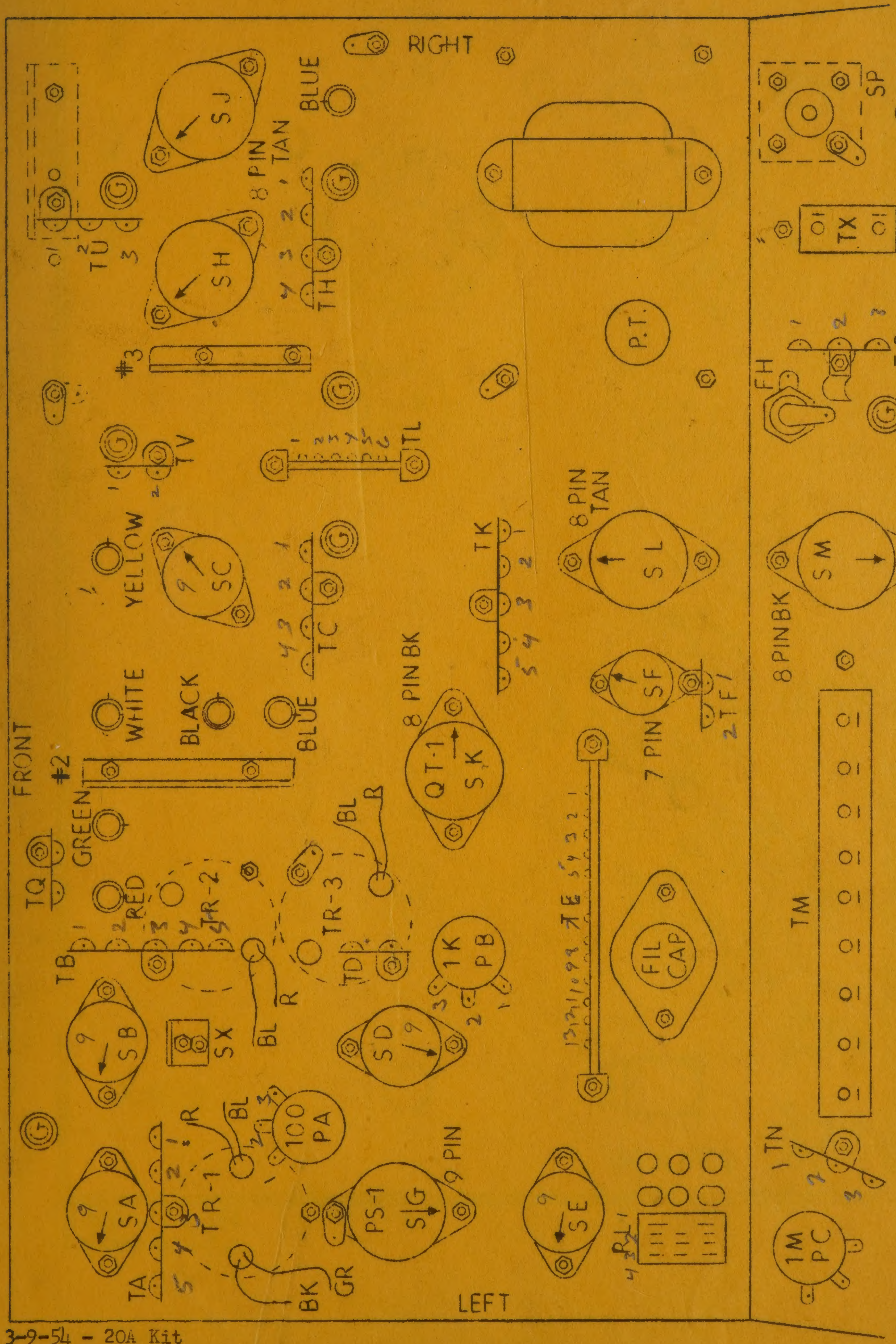


RIGHT
LEFT
FRONT
REAR
SJ
SH
TU
TH
8 PIN, TAN
BLUE
#3
TV
TL
YELLOW
SC
TC
WHITE
BLACK
BLUE
8 PIN BK
QT-1
SK
TK
8 PIN TAN
SL
SF
7 PIN
TF
#2
GREEN
TQ
RED
TR-2
TB
TR-3
TD
1K PB
SB
SX
BL
R
SD
FIL CAP
TE
SA
TR-1
100 PA
PS-1
SG
9 PIN
BK
GR
TA
SE
RL
TM
1M PC
TN
SM
8PINBK
P.T.
FH
TP
TX
SP
GND

3-9-54 - 20A Kit
Printed in U.S.A.

FIG. 1

PANEL - REAR VIEW

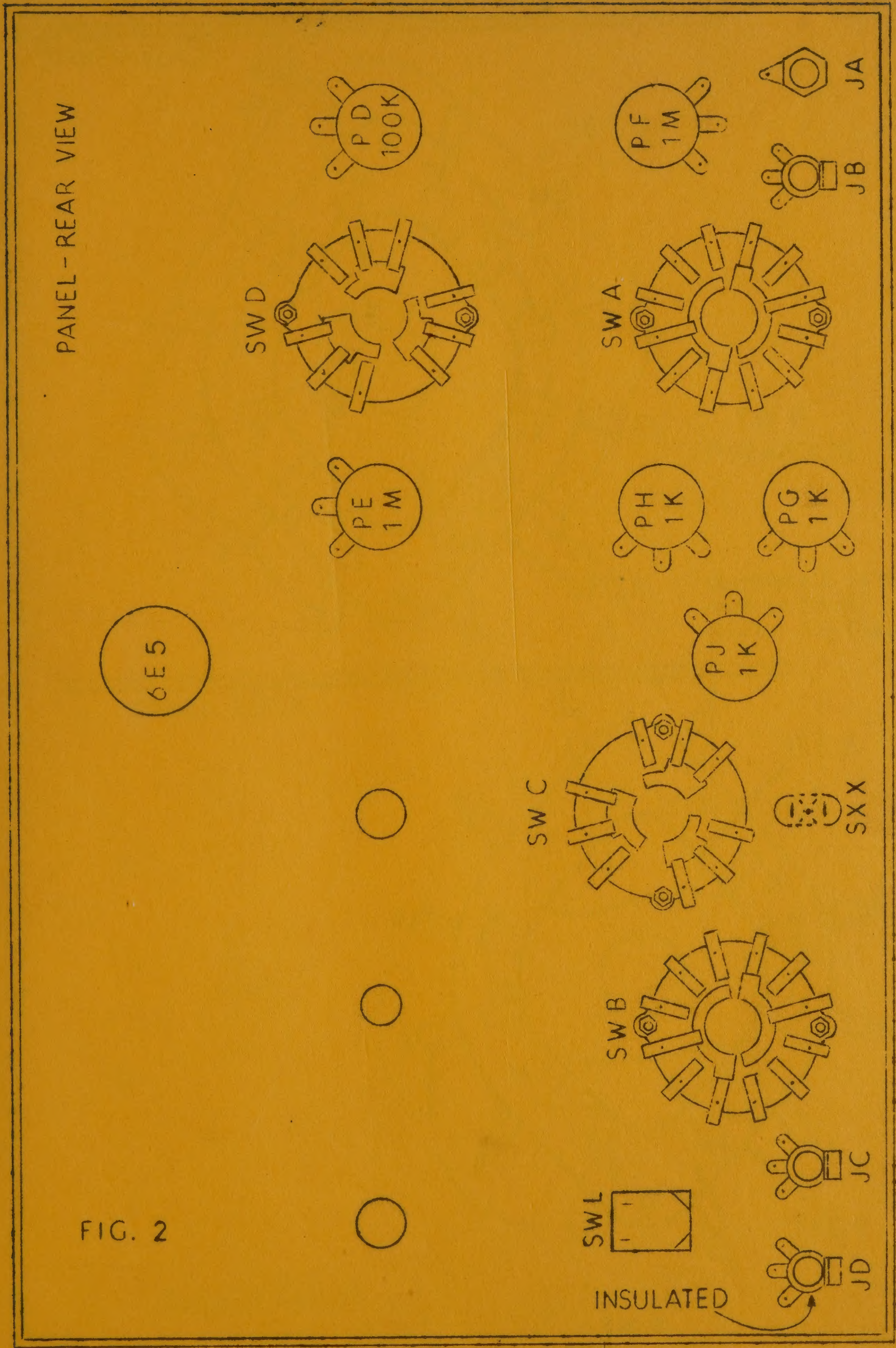
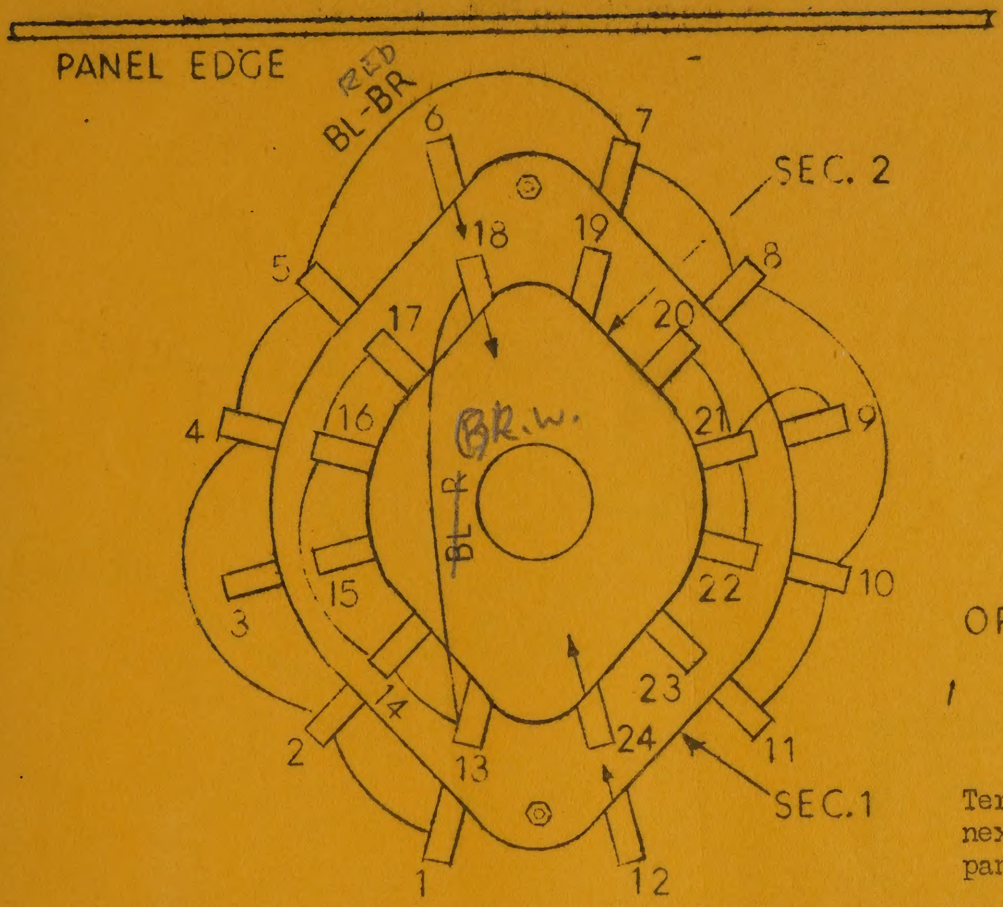

SW D
P D
100K
PE
1 M
6E5
SW A
P F
1 M
JA
JB
PH
1 K
PG
1 K
PJ
1 K
SW C
SXX
SW B
JC
SWL
JD
INSULATED

FIG. 2

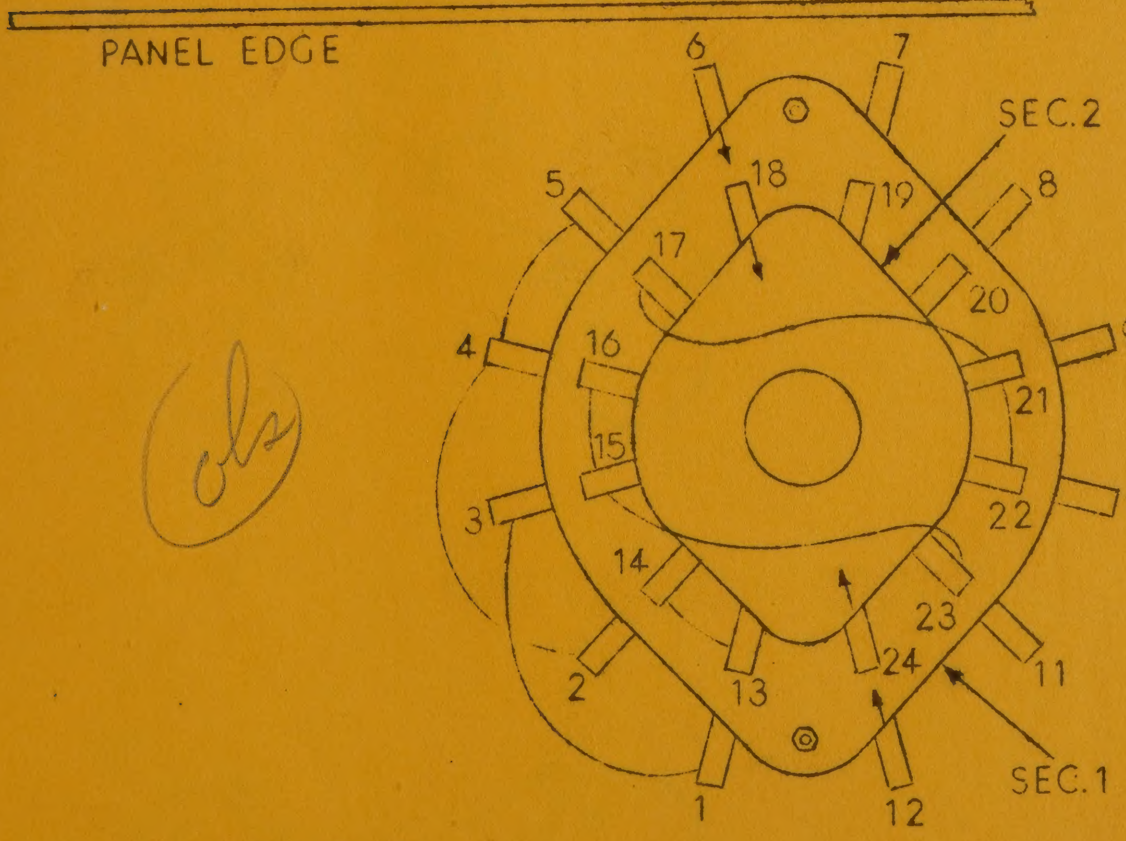
4-9-54 - 20A Kit
Printed in U.S.A.


PANEL EDGE
RED
BL-BR
BR.W.
BL-R
SEC. 2
SEC.1
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

ols

SW B
OPERATION

Terminals 1 to 12
next to front
panel. See Fig. 3

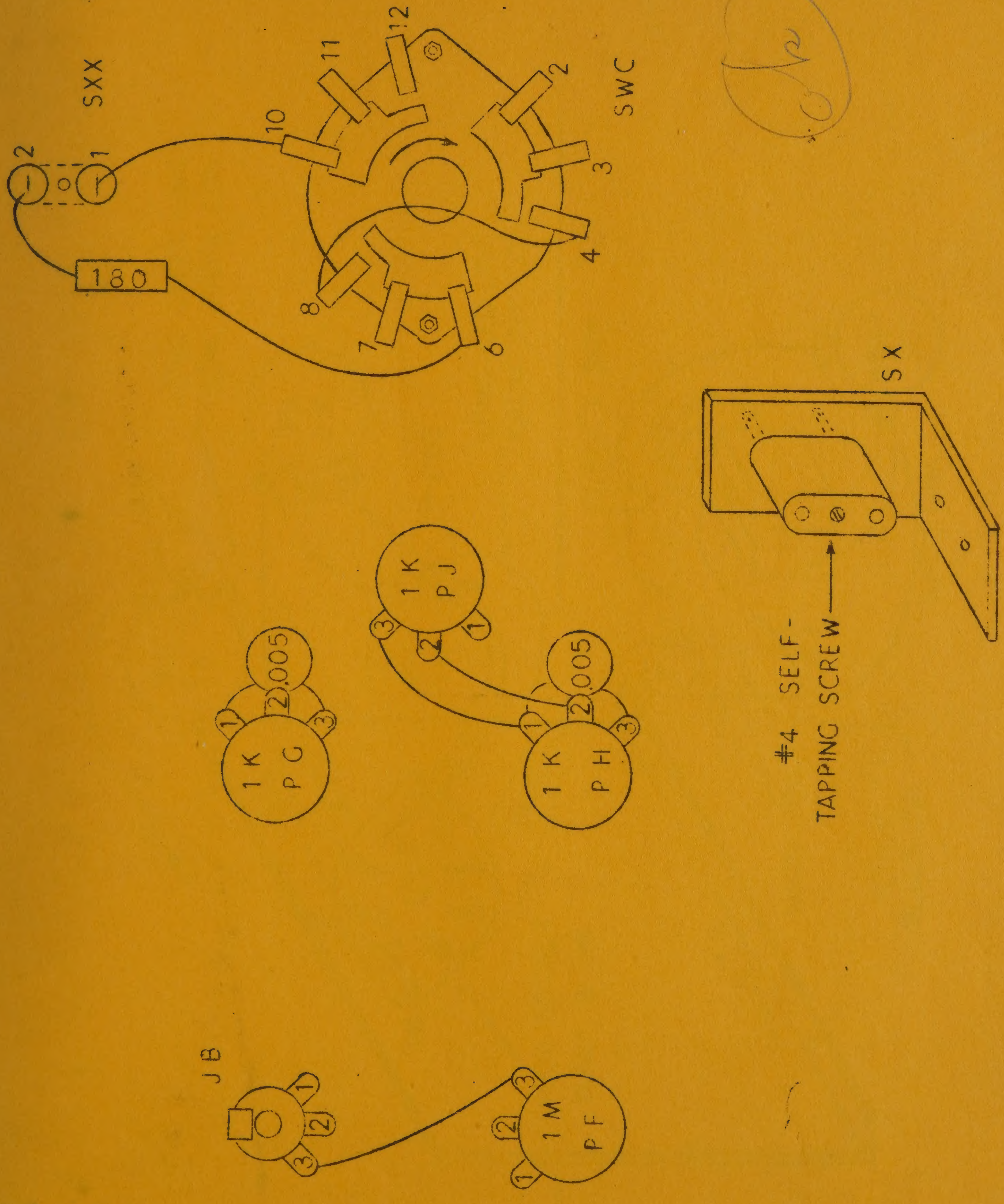

PANEL EDGE
SEC.2
SEC.1
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

ols

SW A
MODULATION

FIGURE 4

4-9-54 -
10-20 Kit - Printed in U.S.A.


SXX
2
1
180
10
11
12
2
3
4
6
7
8
SWC
SX
#4 SELF-TAPPING SCREW
1K
PJ
3
2
1
.005
1K
PG
1
2
3
.005
1K
PH
1
2
3
JB
1
2
3
1M
PF
3
2
1

9-54 10-20 Kit
inted in U.S.A.

FRONT PANEL PRELIMINARY WIRING
FIG. 5

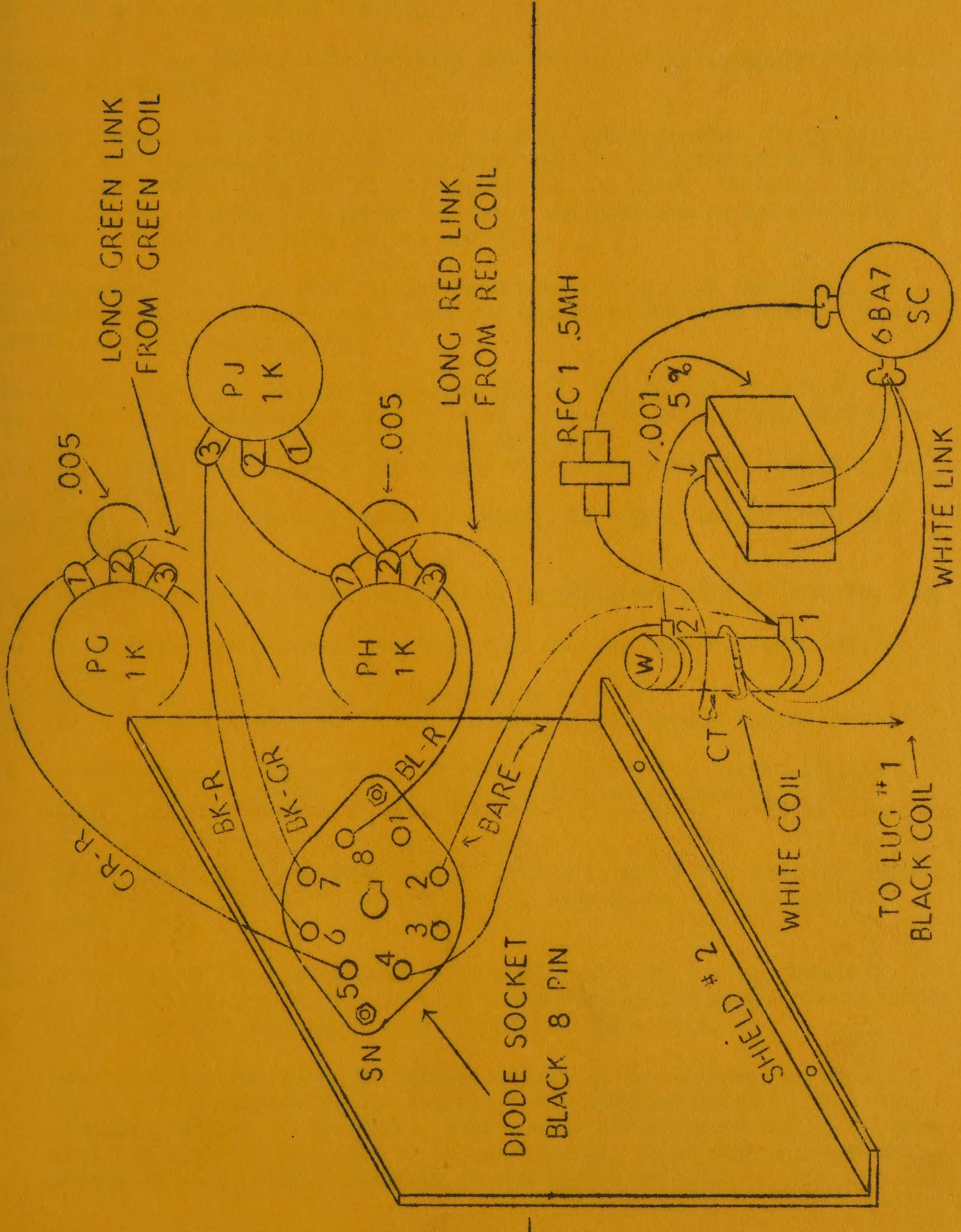

LONG GREEN LINK
FROM GREEN COIL
.005
PJ
1K
1
2
3
.005
LONG RED LINK
FROM RED COIL
PG
1K
PH
1K
RFC 1 .5MH
.001
5%
6BA7
SC
WHITE LINK
W
CT
WHITE COIL
TO LUG #1
BLACK COIL
GR-R
BK-R
BK-GR
BL-R
BARE
1
2
3
4
5
6
7
8
SN
DIODE SOCKET
BLACK 8 PIN
SHIELD #2

FIG. 6

MECHANICAL ASSEMBLY OF MULTIPHASE EXCITER MODEL 20A

Remove the unit from the cabinet and check the clearance between the bandswitch shoulder bushing and the panel. In some units this spacing may vary and it may not be possible to use a backing nut behind the panel. If the space is not sufficient for a nut, use a lockwasher so that the panel will be flush with the shoulder bushing.

Remove the front panel, side brackets and bandswitching assembly to facilitate construction.

Figure 1 shows the bottom view of the chassis and indicates the proper position of the components. On the miniature tube sockets the arrow shows the wide space between pins one and seven, or one and nine. On octal (8) or noval (9) pin sockets, the arrow indicates the position of locating pin between pins one and eight, or one and nine.

All hardware (hdw.) is 5/16" binder head unless otherwise specified. A lockwasher should be used under each nut except in the case where a shakeproof soldering lug is shown.

1. Mount five 9 pin miniature sockets SA, SB, SC, SD and SE with #6 hdw.
2. Mount 7 pin miniature socket SF with two-lug terminal strip TF (three-lug with one cut off) with #6 hdw. as shown.
3. Mount large black PS-1 9 pin socket SG with #6 hdw. and soldering lug as shown.
4. Mount three tan octal sockets SH (6AG7), SJ (6AG7) and SL (5U4) with #6 hdw.

5. Mount black octal socket SN (diodes) to bh#6lld#2 with #6 hdw. See Fig. 6

6. Mount black octal socket SM (VFO) with #6 hdw. and soldering lug as shown.

6a. Mount Black octal socket SK (QT-1) with #6 hdwe.

7. Mount coaxial connector SP with #4-40 hdw. and ground lug as shown.

8. Mount driver transformer TR-1 (27AM24A-1) and 5 lug terminal strip TA as shown. CAUTION: Do not use too much force when tightening these nuts.

9. Mount modulation transformer TR-2 (27A079-3) and 5 lug terminal strip TB as shown. CAUTION: Do not use too much force while tightening these nuts.

10. Mount modulation transformer TR-3 (27A079-3) with two lug terminal strip TD (3 lug with one cut off) and soldering lug as shown. CAUTION: Do not use too much force when tightening these nuts.

1 . When mounting switches and potentiometers on the chassis and panel, use a 3/8-32 cadmium plated "backing" nut and lockwasher so that the threaded portion of the shaft bushing does not protrude too far. This will not apply to the 1/8" thick rack panels, where only a lockwasher should be used, except possibly at the toggle switch.

11. Mount three potentiometers PA (audio balance, either 100 or 200 ohms; PB (audio balance 1000 ohms) and PC (VOX gain 1 meg.) with backing nut, lockwasher and nut.

12. Near the center of the chassis mount four lug terminal strip TC (five lug with one cut off) with #6 hdw.
13. Mount 13 lug terminal strip TE near the left rear side of chassis with #6 hdw.
14. Mount 4 lug terminal strip TH (five lug with one cut off) near the right side of the chassis with #6 hdw.
15. Mount 5 lug terminal strip TK near center of chassis with #6 hdw.
16. Mount ten terminal screw strip TM on outside and three lug terminal strip TN on inside of rear chassis apron with #6 hdw.
17. Mount 6 lug terminal strip TL near center of chassis with #6 hdw.
18. Mount three lug terminal strip TP and cable clamp on rear apron of chassis with #6 hdw.
19. Mount two lug terminal strip TQ (three lug with one cut off) near front of chassis with #6 hdw.
20. Mount three lug terminal strip TU (five lug with two cut off) and variable condenser bracket on right side of the chassis at the front with #6 hdw. There are two sets of holes which will accept the bracket. Use the pair farthest to the right and the bracket should be turned so that the vertical section is toward the front panel and foot of bracket is away from front panel.
21. Mount two lug terminal strip TV (three lug with one cut off) near front with #6 hdw.
22. Mount two screw terminal strip TX on outside of rear apron of chassis next to the co-ax connector with #6 hdw.
23. Mount a soldering lug near right edge of chassis with #6 hdw.
24. Mount 2 soldering lugs near terminal strip TV with #6 hdw., one above the chassis and one below.
25. Mount Xtal socket SX on crystal socket bracket (see figure 5 in wiring section) with #4 self tapping screw. Use #6 hdw. for mounting the bracket.
26. Mount filter capacitor plate FIL CAP near rear of chassis with #6 hdw.
27. Mount fuse holder FH on rear apron of chassis with rubber washer, lockwasher and nut. Install 2A Slo-Blo fuse.
28. Insert the 1/4-20 screw GND in rear right apron of chassis with the head and a lockwasher on the inside, and a nut on the outside. This is the ground terminal for the Exciter.
29. Before mounting the coils, be sure to scrape the enamel from the center-tap of the WHITE coil.
30. Mount the seven slug tuned coils RED, GREEN, WHITE, BLACK, BLUE, YELLOW and BLUE. The two BLUE coils are identical. The lock washer should be used between the coil form and the chassis to prevent the coil from turning when the nut is tightened. Orient the lugs as shown.
31. Mount the 380 mmf. variable capacitor to the bracket with #6-32 x 3/16" binder head screws and lock washers. Mount two soldering lugs on the rear of the variable capacitor by using the two tapped holes as shown in figure 3, with #6 hdw.
32. Mount the 40-40 mfd filter capacitor on the plate by twisting the tabs.
33. Place seven 3/8" grommets in holes marked "G".

34. Shields #2 and #3 should not be mounted until the wiring is completed.
35. To prevent damage to the voice control relay, it is suggested that it be mounted only when you are instructed to do so. Two #8/32 screws are furnished for this purpose.

ASSEMBLY OF THE FRONT PANEL

Refer to Figure 2 for position of the front panel components. The backing nuts should not be used with 1/8" thick rack style panels, except on the toggle switch.

36. Mount Indicator Level potentiometer PE (1 megohm) with cad. pl. backing nut, lockwasher, nickel pl. washer and nickel pl. nut.
37. Mount Indicator switch SWD (3 pole 2 pos.) with cad. pl. backing nut, lockwasher, nickel pl. washer and nickel pl. nut.
38. Mount Cal Level potentiometer PD (100,000 ohms) with cad. pl. backing nut, lockwasher, nickel pl. washer and nickel pl. nut.
39. Mount Speech Level potentiometer PF (1 megohm) with cad. pl. backing nut, lockwasher, nickel pl. washer and nickel pl. nut.
40. Mount Mic. connector JA with lockwasher, soldering lug and nut as shown.
41. When mounting jacks on 1/8" rack type panels, the lockwasher should not be used and the nickel pl. flat washer should not be used on Phones jack JD. Mount Audio Input jack JB with lockwasher, nickel washer and and nickel pl. nut.

The Modulation Switch SWA and the Operation Switch SWB are identical, 4 pole 5 position. The sections are also symmetrical so that rotating their position 180 degrees will not affect the wiring.

42. Mount the Modulation selector SWA with cad. pl. backing nut, lockwasher and cad. pl. nut.
43. Mount the Carrier Null potentiometers PG and PH (1000 ohms) with cad. pl. backing nut, lockwasher, nickel pl. washer and nickel pl. nut.
44. Mount Carrier potentiometer PJ (1000 ohms) with cad. pl. backing nut, lockwasher and cad. pl. nut.
45. Mount VFO Xtal switch SWC (3 pole 2 pos.) with cad. pl. backing nut, lockwasher and cad. pl. nut.
46. Mount XTAL socket SXX with #4 self-tapping screw.
47. Mount Operation selector SWB (4 pole 5 pos.) with cad. pl. backing nut, lockwasher and cad, pl. nut.
48. Mount toggle switch SWL (Power) with backing nut; lockwasher and ring nut on outside.
49. Mount Key jack JC with lockwasher, nickel pl. washer and nickel pl. nut.
50. Mount PHONES jack JD with lockwasher, two insulating washers, nickel pl. washer and nickel plated nut.

Do not attach the front panel to the chassis until all the chassis wiring has been completed. A certain amount of wiring of switch jumpers, etc. must be done first.

WIRING PROCEDURE FOR MULTIPHASE EXCITER MODEL 20A

Central Electronics will not be responsible for the operation of the equipment if soldering paste or acid core solder is used. Use corrosion free resin core solder only.

Care should be taken when soldering precision resistors and capacitors since excessive heat can change their value and affect the operation of the unit. Do not cut the leads too short. Arch all leads so that the components will not be subjected to mechanical stress whenever the chassis or panel are flexed, or tubes plugged in. Holding the leads of the precision components with a long nose pliers while soldering will aid in conducting the heat away from the part.

All tube sockets, potentiometers and switches are numbered in a clockwise direction when viewing the chassis from the bottom. Terminal strips are numbered from Front to Rear, or Right to Left when the chassis is upside down and the front panel away from you.

(S) means solder (NS) means not solder

POWER TRANSFORMER AND CHOKE

1. A yellow wire from power transformer (PT) to SL 2 (S)
2. A yellow wire from PT to SL8 (NS)
3. A red wire from PT to SL 4 (S)
4. A red wire from PT to SL6 (S)
5. A red-yellow wire from PT to TF2 (NS)
6. An orange wire from Filter Choke to SL8 (NS)
7. An orange wire from Filter Choke to TK5 (NS)
8. A flexible green wire (filament ct.) from PT to TK4 (NS)
9. A red-black wire from PT to TK3 (NS)
10. Add a bare jumper from TK4 (S) to TK3 (NS)
11. A black wire from PT to TP1 (NS)
12. A black wire from PT to TP3 (NS)

Push all these transformer leads flat against the chassis. Now lay the wiring harness in the chassis. The two coaxial cables should be at the right side, and go from front to rear. The heavy bend in the harness is to the right, near the filter choke.

13. A heavy green double wire (6.3V fil.) from PT to TK2 (NS)
14. A heavy green double wire (6.3V fil.) from PT to TK1 (NS)

These heavy green wires lay over the top of the harness and should be pressed down flat against it.

In the following, all wires originate from the harness unless otherwise stated:

AT FIVE LUG TERMINAL STRIP TK NEAR CENTER OF CHASSIS

1. Two black wires to TK3 (S)
2. Four brown wires to TK1 (S)
3. Four yellow wires to TK2 (S)
4. Two red-yellow wires to TK5 (S)

AT SL AND SF (6AL5 and 5U4G SOCKETS)

1. A blue-red wire to SL8 (S)
2. Two yellow wires to SF4 (S)
3. Two brown wires to SF3 (S)
4. A blue wire to SF7 (NS)
5. A brown-yellow wire to SF2 (NS)
6. An orange wire to SF1 (NS)

AT SM (VFO SOCKET ON APRON OF CHASSIS)

1. Two black wires to ground lug (NS)
2. Add a bare jumper from ground lug to SM1 (NS)
3. A yellow wire to SM2 (S)
4. Two red-yellow wires to SM3 (NS)
5. A brown-yellow wire to SM4 (NS)
6. Two blue-brown wires to SM6 (NS)
7. A brown wire to SM7 (S)
8. Cut to proper length and strip the coaxial cable. It should clear the 5U4G rectifier socket by at least one inch. The inner conductor goes to SM5 (S) and the outer shield to SM1 (S).

AT TX AND SP (COAX CONNECTOR AND 2 TERMINAL SCREW STRIP)

1. Add a bare jumper from center pin of coax connector SP (S) to TX1 (NS)
2. Add a bare jumper from ground lug of coax connector SP (S) to TX2 (NS)
3. Cut to proper length and strip coax cable so the inner conductor goes to TX1 (S) and outer shield to TX2 (S)

AT TM (10 TERMINAL SCREW STRIP ON REAR OF CHASSIS)

1. A black wire to TM1 (S)
2. A blue-white wire to TM2 (NS)
3. Add a bare jumper from TM3 (S) to TM2 (S)
4. A blue-yellow to TM4 (S)
5. A black to TM5 (S)
6. A black-orange to TM6 (S)
7. A blue-brown to TM7 (NS)
8. A green to TM8 (S)
9. A white to TM9 (S)
10. A slate to TM10 (S)
11. Add a bare jumper on the outside screw terminals from #6 to #7. This jumper will be requred in practically all applications. Refer to Operating Instructions.

AT TN AND PC (VOX GAIN CONTROL AND 3 LUG TERMINAL STRIP)

1. A blue to TN1 (NS)
2. A black to TN2 (NS)
3. Add a bare jumper from TN2 (S) to PC1 (S)
4. Add a length of shielded wire from PC (VOX gain control) along the left fold of the chassis to the vicinity of SA (12AT7-A speech preamplifier). When the front panel is attached, it will connect to PF, the SPEECH LEVEL control. The inner conductor goes to TN3 (NS) and the outer braid should be spot soldered at two or three places along the fold. Be careful to avoid soldering near the side bracket screw holes and loop the wire away from these holes to permit screw clearance. See Fig. 3.

AT TE (13 LUG TERMINAL STRIP)

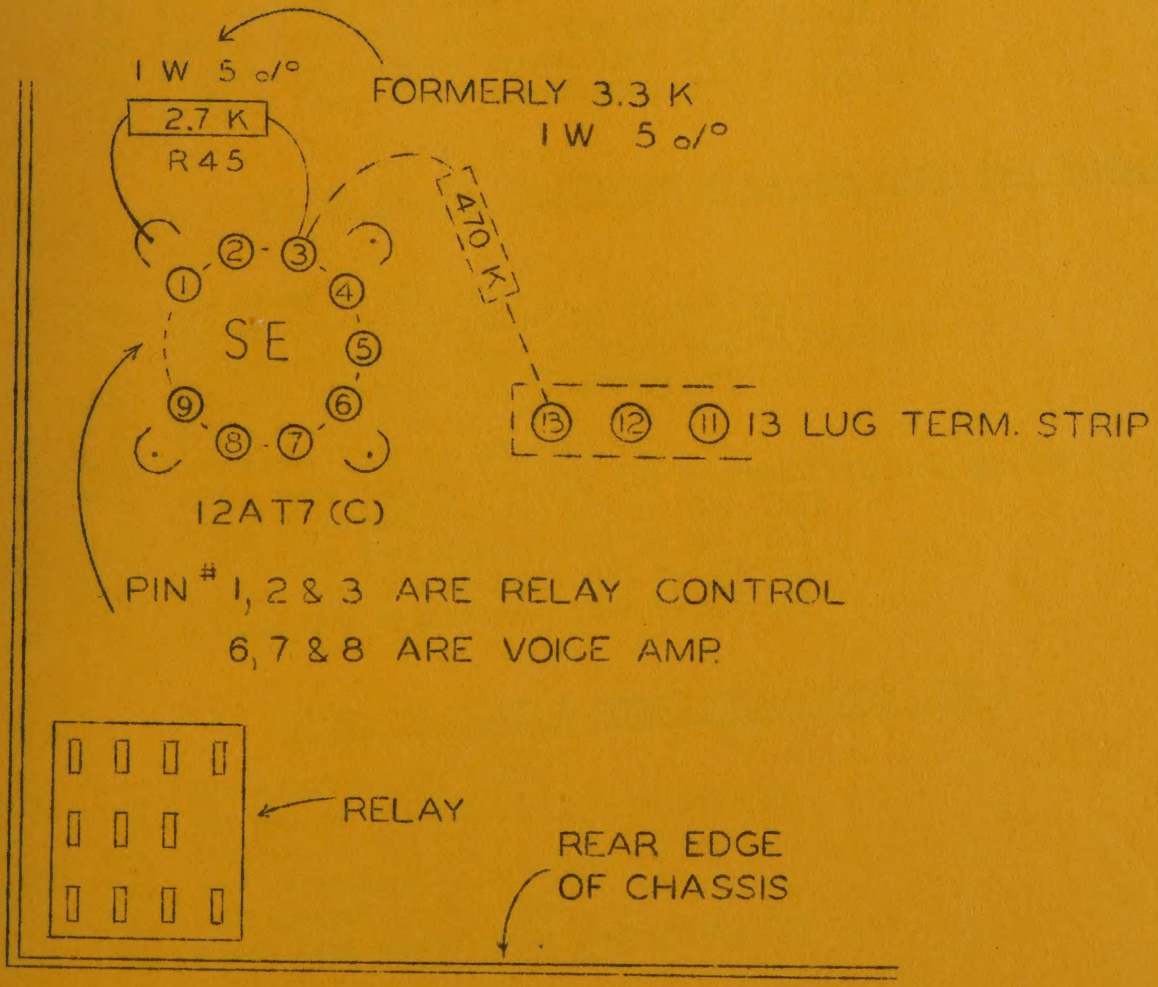
1. An orange to TE2 (NS)
2. A green-white to TE3 (NS)
3. A black-white to TE4 (NS)
4. Add a bare jumper from TE4 (NS) to TE3 (NS)
5. Two brown-yellow to TE6 (NS)
6. Add a bare jumper from TE6 (S) to TE5 (NS)
7. A black-green to TE7 (NS)
8. A red-white to TE8 (NS)
9. Two red-yellow to TE9 (NS)
10. Add a bare jumper from TE10 (NS) to TE11 (NS)
11. A green-red to TE12 (NS)
12. A green to TE1 (NS)

AT THE 40-40 MFD. 450V FILTER CAPACITOR

1. A black to ground tab of can (S)
2. A blue-red to terminal #1 (S)
3. Two red-yellow to terminal #2 (S)

10B - 20A CHANGE NOTICE

In order to obtain greater relay sensitivity and a longer "hold in period" during VOX operation, R45, the cathode resistor of Relay Control Tube 12AT7C, has been changed from 3.3K ohms 5% to 2.7K ohms 5%.


I W 5 o/o
2.7 K
R 4 5
FORMERLY 3.3 K
I W 5 o/o
470 K
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨
S E
⑬ ⑫ ⑪ 13 LUG TERM. STRIP
12AT7 (C)
PIN # 1, 2 & 3 ARE RELAY CONTROL
6, 7 & 8 ARE VOICE AMP.
RELAY
REAR EDGE
OF CHASSIS

10B - 20A Change Notice
12-7-54
Printed in U.S.A

AT SK (QT-1 SOCKET NEAR CENTER OF CHASSIS)

1. A black to SK1 (S)
2. Two brown to SK2 (S)
3. Two red-yellow to SK3 (S)
4. An orange-white to SK4 (NS)
5. Two blue-white to SK5 (S)
6. Two blue-yellow to SK6 (S)
7. Two yellow to SK7 (S)

AT SE (12AT7-C VOICE AMP. AND RELAY CONTROL)

1. Two yellow to SE9 (S)
2. Two brown through SE4 (S) to SE5 (S)
3. A green-orange to SE2 (S)

AT SG (LARGE 9 PIN PS-1 SOCKET)

1. A black to SG1 (S)
2. Add an insulated jumper from SG2 (NS) to SG6 (NS)
3. Add an insulated jumper from SG3 (NS) to SG7 (NS)
4. A green from driver transformer TR-1 to SG2 (S)
5. A black from driver transformer TR-1 to SG3 (S)

AT SD, PA, PD, TD (12AT7-B Modulator, Audio Bal. Pots, etc.)

1. Two brown to SD9 (NS)
2. Two yellow through SD4 (NS) to SD5 (S)
3. A black-white to upper right SD ground lug (NS)
4. A black to upper left SD ground lug (S)
5. A black-white to PA2 (S)
6. Two red-yellow to TD1 (NS)
7. Add a bare jumper from PB3 (S) to lower right SD ground lug (S)
8. A red from transformer TR-3 to TD1 (NS)
9. A red from transformer TR-2 to TD1 (S)
10. A blue from transformer TR-3 to SD1 (S)
11. A blue from transformer TR-2 to SD6 (S)

AT SA, TA (12AT7-A SPEECH PREAMPLIFIER, ETC.)

1. Two brown to S~~A~~9 (S)
2. Two yellow through SA5 (S) to SA4 (S)
3. A black to TA3 (S)
4. Two red-yellow to TA2 (NS)
5. A black-red to TA1 (NS)
6. A red from transformer TR-1 to TA1 (S)

AT SB, TB, SX (6U8) XTAL OSC. & DRIVER, XTAL HOLDER, ETC.

1. A brown to SB4 (S)
2. A yellow to SB5 (S)
3. A blue from transformer TR-1 to SB1 (S)
4. A black to lower left SB ground lug (NS)
5. Add a bare jumper from SB7 (S) to lower right SB ground lug (NS)
6. A red-yellow to TB2(NS)
7. Four leads from the harness, blue-orange, black, orange-yellow and brown-white go through the grommet to the top of chassis.
8. Make a twisted pair of wires, green and black, about 8" long. Black wire goes to upper left SB ground lug (S) and green wire to SB9 (NS). The other end of the twisted pair go through the grommet to the top of chassis.
9. Add a green jumper from SB2 (S) to SX1 (NS)

AT SC AND TC (6BA7 MIXER SOCKET)

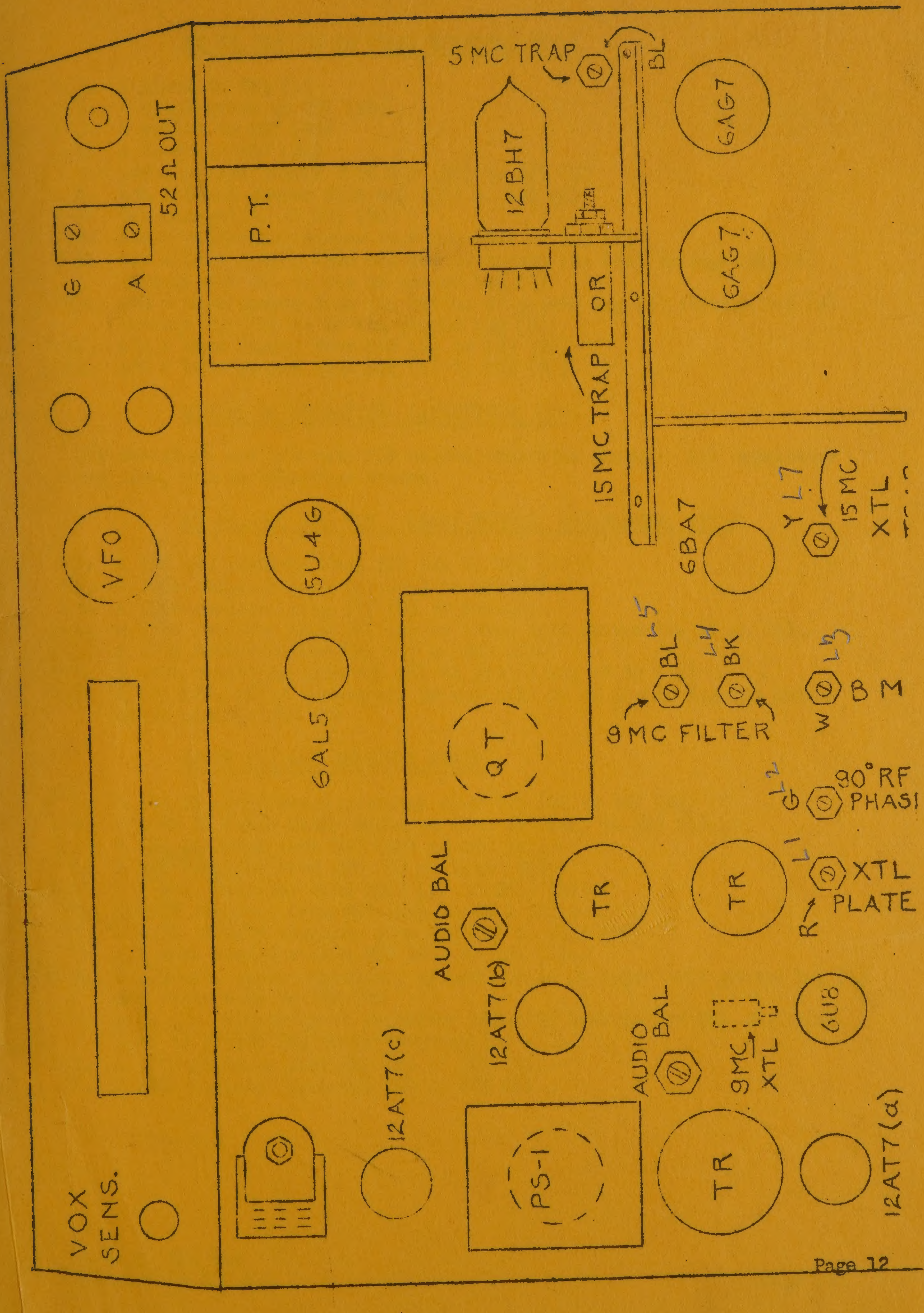
1. Two brown to SC4 (S)
2. Two yellow to SC5 (S)
3. Add a bare jumper from SC bottom ground lug (NS) through SC3 (S) to center shield (NS) through SC8 (S) to SC top ground lug (NS).
4. Add a bare jumper from SC6 (S) to SC center shield (S)
5. Add a bare jumper from SC top ground lug (NS) to terminal #1 of the yellow coil (S)
6. A green-white to TC3 (NS)
7. Two green to TC1 (NS)

AT TL (SIX LUG TERMINAL STRIP)

1. Lay a .25 mfd. tubular capacitor between the terminal strip and the harness. The band (ground) on the capacitor should be towards the rear of the chassis. The ground lead from the capacitor goes to the ground lug (NS) under the PT nut. The other end to TL3 (NS)

   The following harness leads should be formed over the top of the .25 mfd. capacitor:

2. Two red-yellow to TL1 (NS). Be sure to allow room for Shield #3 when it is attached later.
3. A yellow to TL2 (NS)
4. An orange-yellow to TL3 (NS)
5. A brown-white to TL4 (NS)
6. A brown to TL5 (NS)


VOX SENS.
52 Ω OUT
G
A
P.T.
5 MC TRAP
BL
12BH7
6AG7
6AG7
OR
15 MC TRAP
VFO
5U4G
6BA7
Y L7
15 MC XTL
6AL5
QT
BL L5
BK L4
9 MC FILTER
W L3 B M
G L2
90° RF PHASI
L1
XTL PLATE
R
TR
TR
AUDIO BAL
12AT7(b)
AUDIO BAL
9MC XTL
6U8
PS-1
TR
12AT7(c)
12AT7(a)

AT SH, SJ AND TH (6AG7 SOCKETS, ETC.)

1. A black to TH3 (S)
2. A black-green to TH2 (NS)
3. A yellow to SH7 (NS)
4. A brown to SH2 (NS)
5. Add a yellow jumper from SH7 (NS) to SJ7 (S)
6. Add a brown jumper from SH2 (NS) to SJ2 (S)
7. Two red-yellow to SH3 (NS)
8. Add a red-yellow jumper from SH3 (NS) to SJ3 (NS)
9. Add a bare jumper from SH1 bottom ground lug (NS) through SH5 (S) through SH1 (S) to top SH ground lug (S)
10. Add a bare jumper from the bottom SJ ground lug (S) through SJ5 (S) through SJ1 (S) to SJ top ground lug (NS)
11. Add a bare jumper from SH8 (S) to TU3 (NS)
12. Add a bare jumper from SJ8 (S) to TU3 (NS)

WIRING OF RESISTORS, CAPACITORS, ETC.

All resistors are 1/2 watt 10% unless otherwise stated. All capacitors are mica, unless otherwise stated.

AT SF, SM, TF, ETC. (6AL5 SOCKET, VFO SOCKET, ETC.)

1. A 100 ohm resistor from TF2 (S) to SF5 (S)
2. A 100K resistor from TF1 (NS) to SF7 (S)
3. A 100K resistor from TF1 (S) to SF2 (S)
4. A 470K resistor from SF1 (S) to lower left ground lug of SL (S)
5. A 220K resistor from SM4 (S) to SM6 (S)
6. A .006 capacitor from SM3 (S) to ground lug of SM (NS)
7. A .25 mfd. paper capacitor, ground side to SM ground lug (S) and other side to TM7 (S)

AT TE (13 LUG TERMINAL STRIP)

1. A 10K 5% (gold band) resistor from TE4 (S) to TE7 (NS)
2. A 100K 5% (gold band) resistor from TE5 (NS) to TE7 (S)
3. A 68K resistor from TE5 (NS) to TE8 (NS)
4. A 47K resistor from TE8 (S) to TE10 (NS)
5. A 1 meg. resistor from TE10 (S) to TE12 (S)
6. A 470K resistor from TE9 (NS) to TE11 (S)
7. A 4.7K 2 watt resistor from TE9 (S) to TE13 (NS)
8. A 1 meg. resistor from TE2 (NS) to SK4 (S)
9. A .25 mfd. paper capacitor, ground end to SL upper left ground lug (S) and other side to TE2 (S)
10. A 40 mfd. electrolytic capacitor NEGATIVE lead to TE5 (NS), POSITIVE lead to ground lug ~~under TR-3 nut (S)~~
11. A 220K resistor from TE3 (S) to TE5 (NS)
12. A 220K resistor from TE1 (SO to TE5 (S)

AT SG AND SD (PS-1 AND 12AT7-B SOCKETS)

1. A .005 ceramic capacitor from SD4 (S) to upper right ground lug of SD (S)
2. A .005 ceramic capacitor from SD9 (S) to lower left ground lug of SD (NS)
3. Add a green-white jumper from SG8 (S) to SD2 (S)
4. Add a green jumper from SG4 (S) to SD7 (S)
5. A 1K 1 watt resistor from SD3 (S) to lower left ground lug of SD (S)
6. A 560 ohm resistor from SD8 (S) to PB2(S)
7. A 1400 ohm 1% resistor from SG6 (S) to PA1 (S)
8. A 400 ohm 1% resistor from SG7 (S) to PA3 (S)

AT SA AND TA (12AT7-A SOCKET)

1. A .005 paper capacitor from SA1 (NS) to SA7 (NS)
2. A 2.2K resistor from SA8 (S) to upper left ground lug of SA (S)
3. A 220K resistor from SA1 (S) to TA4 (NS)
4. A 220K resistor from SA7 (S) to lower right ground lug of SA (S)
5. A 220K resistor from SA6 (NS) to TA4 (NS)
6. A 10K resistor from TA2 (S) to TA4 (NS)
7. An 8 mfd. electrolytic capacitor, POSITIVE lead to TA4 (S) NEGATIVE lead to ground lug of SG (NS)

AT SB AND SX (6U8 SOCKET AND CRYSTAL HOLDER)

1. A 250 mmf capacitor from SB9 (NS) to upper right ground lug of SB (S)
2. A 1K resistor from SB8 (S) to lower right ground lug of SB (NS)
3. A 100K resistor from SX1 (NS) to lower left ground lug of SB (NS)
4. A 75 mmf 5% capacitor from SX2 (NS) to lower left ground lug of SB (S)

2,7MMF *

5. A 3 mmf capacitor from SX1 (S) to lower right ground lug of SB (S)
6. A .001 capacitor from SX2(S) to SB3 (NS)

AT TB AND TQ (NEAR THE RED AND GREEN COILS)

On all slug tuned coils, term. #1 is nearest the chassis

1. A .001 capacitor from TQ1 (S) to TQ2 (NS)
2. The SHORT green link wire of the Green coil to TQ2 (NS)
3. A .001 capacitor from TB1 (NS) to TB3 (NS)
4. The SHORT red link wire of the Red coil to TB1 (NS)
5. A .006 capacitor from TB3 (NS) to TB5 (NS)
6. Add an arched blue jumper from SB6 (S) to Red coil term. #1 (NS). This lead should have sufficient length so that the Red coil may freely traverse the slot.
7. A 560 ohm resistor from TB2 (S) to TB5 (NS)
8. Add an arched bare jumper from TB5 (NS) to Red coil term. #2 (NS), then arch the wire again to Green coil term. #2 (NS)
9. A 150 mmfd. 5% capacitor from Red coil term. #1 (S) to Red coil term. #2 (S)
10. A 150 mmfd. 5% capacitor from Green coil term. #1 (S) to Green coil term. #2 (S)
11. A 47K 1 watt resistor from TB4 (NS) to TB5 (S)
12. A .005 ceramic capacitor from TB3 (NS) to TB4 (NS)
13. A 2.5 mh (4 pie) R.F.C. from TB4 (S) to SB3 (S)

* Tan Case

AT SC, TL (6BA7 SOCKET ETC.)

1. A 150 mmfd. 5% capacitor from bottom ground lug of SC (S) to Black coil term. #2 (S)
2. Add a bare jumper from TC4 (NS) to Blue coil term. #1 (NS)
3. A 150 mmfd. 5% capacitor from Blue coil term. #1 (S) to Blue coil term. #2 (NS)
4. A .006 capacitor from TC2 (NS) to TC4 (NS)
5. A 1K resistor from TC4 (S) to TC3 (S)
6. A 47K resistor from TC1 (NS) to SC2 (NS)
7. A .005 ceramic capacitor from TC1 (S) to TC2 (S)
8. A 36 mmfd. 5% capacitor from SC1 (NS) to Yellow coil term. #2 (S)
9. A 4.7K two watt resistor from SC1 (NS) to TL6 (NS)
10. Now mount the bandswitching assembly with #6 hdw. and be sure to include soldering lug for C85 as shown in Fig. 3. Do not put a screw in the center hole of the back flange until shield #3 is mounted, after most of the wiring is completed.

    All the leads except the blue go through the grommet at the right of terminal strip TL. The blue lead goes through the grommet to the right of terminal strip TC.

11 Two red-yellow from BA (Bandswitching Assembly) to TL1 (NS)
12 A yellow from BA to TL2 (S)
13 An orange-yellow from BA to TL3 (S)
14. A brown white from BA to TL4 (S)
15 A brown from BA to TL5 (S)
16 A 10K 10 watt resistor from TL1 (S) to TL6 (NS)
17 A 15K 10 watt resistor from TL6 (S) to ground lug under PT (S)
18 The blue lead from the bandswitching assembly to SC9 (S)

AT SH, SJ, TH AND TU (6AG7 SOCKETS)

1. Press the ground jumpers from terminals 1 to 5 on SH and SJ as close to the socket base as possible. All leads and components connecting to the 6AG7 grid and plate leads (pins 4 and 8) should be kept reasonably short and placed in such a manner to prevent excessive capacity between the two circuits. The .006 screen by-pass capacitors from terminals #6 to ground should be at right angles to the chassis and placed directly over the socket so they will act as a shield.
2. A 180 ohm resistor from SH6 (NS) to SH3 (S). Press as close to the socket as possible. Be careful of shorts.
3. A 180 ohm resistor from SJ6 (NS) to SJ3 (NS). Press as close to socket as possible.
4. A .006 capacitor from SH6 (S) to right ground lug of SH (S)

5. A .006 capacitor from SJ6 (S) to right ground lug SJ (S)
6. A .006 capacitor from TH4 (NS) to left ground lug of SH (S)
7. A .006 capacitor from SJ3 (NS) to ground lug near Blue coil (NS)
8. A 2.5 mh. (4 pie) R.F. choke from SJ3 (S) to TU3 (NS). Keep the leads reasonably short and place choke about 1/4" away from chassis.
9. A 100 ohm resistor from SH4 (S) to Blue coil term. #1 (NS)
10. A 100 ohm resistor from SJ4 (S) to Blue coil term. #1 (NS)
11. Add a bare jumper from TH1 (NS) to Blue coil term. #2 (NS)
12. A .1 mfd. paper capacitor from TH4 (NS) to ground lug near Blue Coil (S)
13. A 1K 1 watt resistor from TH4 (NS) to TH2 (S)

X 1 watt

14. A 5.6K resistor from TH1 (NS) to TH4 (NS)
15. A 1/2 mh. RF choke (single pie) from TH1 (NS) to TH4 (S)
16. A .005 ceramic capacitor from SH7 (S) to bottom SH ground lug (S)
17. A .005 ceramic capacitor from SH2 (S) to SJ top ground lug (S)
18. A 390 mmfd 5% capacitor from Blue coil term. #1 (S) to Blue coil term. #2 (S)

BAND SWITCHING ASSEMBLY

Refer to Fig. 3. Section 1 on the switch is next to the front panel.

1. The coaxial cable from the output terminals should go through the grommet hole near terminal strip TV. Cut this cable to proper length and trim so that the center conductor goes to term. #12 section #2 (bakelite wafer), on which a white lead has been soldered. (S)
2. The outer shield of the coaxial cable to ground lug on chassis, near the grommet (S)
3. A .006 capacitor (on top of chassis) one end to variable capacitor stator lug (NS) and the other through the grommet to TU3 (S)
4. Add a spaghetti covered jumper from variable capacitor stator lug (S) to switch Section 1 (ceramic) term. 3 (S). This is the terminal next to the slate colored wire.
5. The free end of a .001 mica capacitor (C80) through the grommet to TH1 (S)
6. A .006 capacitor (C85) one lead to ground lug on edge of chassis (S) the other to the common side of the trimmer assembly at C81 (S)
7. The free end of L12B (heavy lead at the end of the large coil assembly mounted on the polystyrene strip) to the nearest ground lug on the frame of the variable capacitor C62 (S)
8. L12A (the small coil) has one end soldered to Section #1 of the switch and the other end to a soldering lug on the shield. Unsolder the end from the lug on the shield and solder it on the left lug on the frame of the variable capacitor, C62

PRELIMINARY WIRING OF THE FRONT PANEL

On the two deck switches, Terminals 1 to 12 are next to the front panel.

ON THE TWO DECK SW, TER. 1 TO 12 ARE NEXT TO THE FRON PANEL

SWITCH SWA (MODULATION) REFER TO FIG. 4 (BOTTOM OF PAGE)

ON ~~DECK TWO~~ S

1. A bare jumper from term. #1 (S) to term. #3 (NS) ✓
2. A spaghetti covered jumper from term. #2 (S) through term. #4 (S) bare to term. # 5 (NS) ✓
3. A bare jumper from term. #13 (S) to term. #14 (NS) ✓
4. A spaghetti covered jumper from term. #23 (NS) through term. #15 (S) bare to term. #16 (S) ✓
5. A spaghetti covered jumper from term. #17 (S) through term. #21 (S) bare to term. #22 (NS) ✓

SWITCH SWB (OPERATION) REFER TO FIG. 4 (TOP OF PAGE)

1. A bare jumper from term. #1 (S) through term. #2 (S) through term. #4 (S) to term. #5 (NS) ✓
2. A bare jumper from term. #7 (NS) through term. #8 (S) through term. #10 (S) to term. #11 (S) ✓
3. A bare jumper from term. #13 (NS) through term. #14 (S) through term. #16 (S) to term. #17 (S) ✓
4. A bare jumper from term. #20 (NS) through term. #21 (NS) to term. #22 (S) ✓
5. A bare jumper from term. #21 (S) to term. #9 (S)
6. Add a blue-brown RED jumper from term. #5 (NS) to term. #7 (S) ✓
7. Add a blue-red jumper from term. #13 (NS) to term. #18 (NS) ✓

NOW REFER TO FIG. #5

1. A bare jumper from JB3 (S) to PF3 (NS) ✓
2. A .005 ceramic capacitor from PG1 (NS) to PG3 (NS) ✓
3. A .005 ceramic capacitor from PH1 (NS) to PH3 (NS) ✓
4. A bare jumper from PH1 (S) to PJ3 (NS) ✓
5. A bare jumper from PH2 (NS) to PJ2 (S) ✓
6. A bare jumper from SWC term. #10 (S) to SXX term. #1 (S) ✓
7. A spagetti covered jumper from SWC term. #4 (S) to SWC term. #8 (S) ✓
8. A 180 ohm resistor from SWC term. #6 (S) to SXX term. #2 (S) ✓
9. A bare jumper from JC1 (S) to JC2 (S) (See Fig. 3) ✓

NOW REFER TO FIG. #3

1. Add a black from PE1 (NS) to PD3 (NS) ✓
2. Add a black from PE1 (S) to SWD term. #11 (NS) ✓
3. A 33K resistor from SWD term. #11 (S) to SWD term. #12 (NS) ✓
4. Add a blue-orange wire from SWD term. #12 (S) to PD2 (NS) ✓
5. Add an orange-yellow wire from PE3 (S) to SWD term. #4 (NS) ✓
6. Add a white jumper from PE2 (S) to SWD term. #2 (S) ✓

ATTACHING THE FRONT PANEL

1. Before attaching the front panel, do not forget to have either a lockwasher or backing nut on the bandswitch threaded bushing (whichever is required) as mentioned in the first paragraph of the instructions.

   Do not mount the side brackets until wiring is completed.

2. Turn the chassis upside down to the same position as when you started wiring.
3. The shielded lead (in the left fold of the chassis from PC) center conductor to PF3 (S)
4. A black wire from harness to PF1 (S)
5. A 47K resistor from SB9 (S) to PF2 (S)
6. A 1 meg. resistor from SA2 (NS) to JA ground lug (NS)
7. Add a green-white looped jumper from SA2 (S) to JA center pin (S)
8. A 2.2K resistor from SA3 (S) to JA ground lug (S)
9. A .005 paper capacitor from SA6 (S) to JB2 (S)
10. Add a black jumper from TB3 (S) to SWA term. #24 (NS)
11. A white wire from transformer TR-3 to SWA term. #24 (S)
12. Add a red jumper from TB1 (S) to SWA term. #18 (S)
13. Add a green jumper from TQ2 (S) to SWA term. #6 (S)
14. A brown wire from transformer TR-3 to SWA term. #5 (S)
15. A brown wire from transformer TR-2 to SWA term. #22 (S)
16. A white wire from transformer TR-2 to SWA term. #23 (S)
17. A 15 ohm resistor from SWA term. #14 (S) to JB1 (NS)
18. A 15 ohm resistor from SWA term. #3 (S) to JB1 (S)
19. Mount shield #2 between green and white coils with #6 hdw. The foot of the shield is toward the white, black and blue coils. The diode socket (SH) has soldering pins toward these coils.
20. Add a blue-red jumper from SN8 (S) to PH3 (S)
21. Long red link lead from Red coil will be soldered to PH2 after preliminary alignment.
22. Add a black-red jumper from SN6 (S) to PJ3 (S)
23. Add a black-green jumper from SN7 (S) to PG3 (S)
24. Long green link lead from Green coil to PG2 (S)
25. Add a green-red jumper from SN5 (S) to PG1 (S)
26. Add a bare jumper from SWC term. #12 (S) to ground lug on chassis (S)
27. Cut and trim coax cable at left of TV to proper length; center conductor to TV1 (NS) and ground shield to TV2 (NS)
28. A .001 capacitor from TV1 (S) to SWC term. #3 (S) (A tan case capacitor)
29. Add a bare jumper from TV2 (S) to SWC term. #2 (S)
30. A .006 capacitor from SC1 (S) to SWC term. #11 (S)
31. Add a green-white jumper from SC2 (S) to SWC term. #7 (S)
32. A red-white to JC3 (S)
33. A black-yellow to JD3 (S)
34. A blue-yellow to JD2 (S)
35. A blue-white to JD1 (S)
36. A green to SWB term. #12 (S)
37. A black-white to SWB term. #6 (S)
38. A blue-brown to SWB term. #5 (S)
39. A red-yellow to SWB term. #18 (S)
40. A blue-orange to SWB term. #3 (S)

41. Deleted
42. A black-red to SWB term. #13 (S)
43. A green-red to SWB term. #19 (S)
44. A black to SWB term. #20 (S)
45. A green-orange to SWB term. #24 (S)
46. An orange-white to SWB term. #23 (S)

SEE FIG. 3 and FIG. 6

47. Add a bare jumper from SN2 (S) to White coil term. #1 (NS)
48. Add a bare jumper from SN4 (S) to White coil term. #2 (NS)
*49. The two .001 MF 5% capacitors are placed on edge, side by side, near White coil, as shown in Fig. 3 and Fig. 6.
*50. A .001 MF 5% capacitor from SC left ground lug (NS) to White coil term. #2 (S)
*51. A .001 MF 5% capacitor from SC left ground lug (NS) to White coil term. #1 (S)
52. A white link wire of the White coil to SC left ground lug (S)
53. A white link wire of the White coil to Black coil term. #1 (S)
54. A .5 mh choke (1 pie) RFC-1 from White coil center tap (S) to SC upper ground lug (S)
55. A green-orange jumper from SC7 (S) to Blue coil term. #2 (S)

AT RL, SE, TH, PC (RELAY, 12AT7-C, ETC.)

1. Mount relay with two 8-32 screws and lockwashers
2. A 220K resistor from TE13 (NS) to SE6 (NS)
3. A .05 paper capacitor from SE6 (S) to TN1 (S). Lay this capacitor across the heads of the relay mounting screws.
4. A 470K resistor from TE13 (NS) to SE3 (NS)
5. Add a blue-white jumper from SE1 (S) to RL "B" (S)
6. A 3.3 3.3K 1 watt 5% resistor from SE3 (S) to upper left ground lug(NS)
7. A 1K resistor from SE8 (NS) to SE upper left ground lug (S)

ok for size

8. A 20 mfd. 25 volt capacitor, POSITIVE to SE8 (S), NEGATIVE to SG ground lug (S)
9. Add a red ~~jumper from~~ TE13 (NS) to RL "A" (S)
10. An 8 mfd. 450 Volt electrolytic POSITIVE lead from TE13 (S), NEGATIVE to ground tab of 40-40 filter capacitor (S)
11. A black-yellow to RL1 (S)
12. A black to RL2 (S)
13. A black-orange to RL3 (S)
14. A slate to RL7 (S)
15. A white to RL8 (S)
16. A green to RL9 (S)
17. A .002 paper capacitor from PC3 (S) to TN3 (S)
18. A 470K resistor from SE7 (S) to PC2 (S)

INSTALLING SHIELD #3

1. Mount the small shield (#3) near the 6AG7 tubes with the base toward the right with #6 hdw.

* Red Case

AT FH AND SWL (FUSE HOLDER AND POWER SWITCH)

1. Take about 20 inches of yellow wire and 20 inches of brown wire and twist together. Lay this twisted pair along the right fold of the chassis between the fuse holder and the power switch.
2. A yellow to SWL2 (S)
3. A brown to SWL 1 (S)
4. A yellow to fuse holder end lug (S)
5. A brown to TP3 (S)
6. A .006 capacitor from TP2 (NS) to TP1 (NS)
7. A .006 capacitor from TP2 (S) to side lug of fuse holder (NS)
8. Slip a three inch length of plastic tubing over the end of the line cord and push through the grommet. The cord goes under the cable clamp which is mounted with the screw that holds terminal strip TP.
9. One lead of line cord to TP1 (S)
10. The other line cord lead to side lug of fuse holder (S)

COMPLETION OF UPPER FRONT PANEL WIRING

The following leads come through the grommet near the CAL LEVEL CONTROL

1. A black to PD3 (S)
2. A blue-orange to PD2 (S)
3. A brown-white to SWD3 (S)
4. An orange-yellow to SWD4 (S)
5. From the twisted green and black pair, a black to SWD7 (S)
6. A green to SWD8 (S)

ATTACHING THE KNOBS

The large knobs should be used on the following:

MIXER TUNING
BAND
AMPLIFIER TUNING
MODULATION
CARRIER
OPERATION

When installing the side brackets, see that the screws do not short any leads or components.

Recheck all solder connections and make sure that there are no unwanted shorts or grounds.

Shake the unit right side up to cause loose pieces of solder and wire trimmings to fall out.

INSTRUCTION BOOK #102MX FOR T-21/ARC 5 ONLY

In order to leave room for the 10 meter converter unit, it is necessary to remove the 1625 plate tank RF choke and change the circuit to "series feed."

Refer to BC-458 conversion manual, #101MX, noting the following changes and additions:

I. Do work indicated in #101MX, sections I to VI, inclusive except paragraph VI, steps 9 and 10.

II. ON TOP OF CHASSIS

1. Drill a #25 hole near gear support bracket. Mount rectifier bracket with #6 hardware.
2. Drill two holes in chassis between the 1625 tube sockets, about 1-1/4" apart. See Fig. 7. A 1/4" hole is for a grommet and a #25 hole for a grounded solder lug. Place a 1/4" grommet in the 1/4" hole. Mount solder lug under chassis with #6 hardware. Solder one end of a .006 mf mica capacitor to ground lug under chassis and push free end through grommet, as shown in Figure 7.
3. Remove RF choke and Resistor from right side of chassis and discard.
4. Remove two jumpers from right side of ceramic coil form, as shown by dashed lines in Figure 7. Add a jumper as shown by solid line.
5. Remove the 400 mmf. ceramic capacitor from top of ceramic coil form and replace with a jumper.
6. Punch out ceramic feed thru insulator on right side of chassis and remove orange wire from circuit.

III. AT THE VR75 SOCKET (Formerly the Crystal Socket)

1. Remove resistor between pins #3 and #8 and discard.
2. Remove black lead from pin #3 and discard.
3. Unsolder end of resistor from pin #5.
4. Unsolder black lead from pin #5 and attach to pin #6.
5. Attach free end of resistor (see Step 3) to pin #6 and solder.
6. Solder a jumper between pins #1 and #2.
7. Attach a red wire to pin #4 and solder free end to 1626 tube socket pin #4.
8. Attach a brown wire to pin #5 and run around right side of variable capacitor, then between the two 1625 tube sockets, thru grommet hole.

IV. AT THE 7 PIN SOCKET ON REAR OF CHASSIS (Inside)

Pin #7 is the center pin and others are indicated clockwise.

1. Remove red lead from pin #5 and take out of circuit.
2. Remove two black leads from pin #4 and take out of circuit.
3. Remove black lead from pin #3 (and VR75 tube socket pin #7) and take out of circuit.

BC-458 Kit 102MX
6-29-55
Printed in USA

4. Remove white lead from pin #2 and take out of circuit.
5. Unsolder yellow lead from pin #1 and attach to pin #3.
6. Solder a red wire between pins #3 and #4 and solder other end to VR75 tube socket pin #5. This is B plus 75 volts.

V. ON TOP OF CHASSIS, RIGHT SIDE

1. Solder brown wire and .0068 (or .006) mfd. capacitor lead together and leave about 1" of wire beyond soldered joint. Solder this wire to cylindrical solder lug on bottom of ceramic coil form, as shown in Fig. 6

VI. Turn to the BC-458 conversion manual #MX101 and begin at Section VII. Proceed as shown through XXI.

ALIGNMENT OF THE VFO

Set your receiver and Exciter to 21,450 kc. Advance the carrier knob. With the VFO switch in the 21 MC position and the dial at 21,450 kc., adjust the oscillator air padder (accessible through the hole you have drilled in the side of the oscillator can) for zero beat. This will occur with a little more than half capacity and the slot in the shaft will be slightly beyond the horizontal position. Now remove the can and tighten the set screws. It may be necessary to retune the small single plate air capacitor (accessible through the top of the can) for zero beat.

With the Receiver and Exciter tuned to 3.5 MC, set the VFO bandswitch to 80 meters and the dial to 3.5 MC. Tune the 50 mmfd. capacitor on the front panel for zero beat.* Peak the amplifier air padding capacitor under the chassis between the two variable capacitors for maximum VR tube brilliance or maximum exciter output with the antenna coupler set at 4.

Now return to the 21 MC band. Slowly replace the large cover on the BC-458 and observe the effect upon the output of the Exciter. Replacing this cover reduces the inductance of the coils and increases the resonant frequency. Whenever the cover is off, the coil should have slightly more inductance than necessary. The inductance can be adjusted by breaking the polystyrene strip on the coils so that the last half turn can be varied in spacing to trim the inductor to the required value.

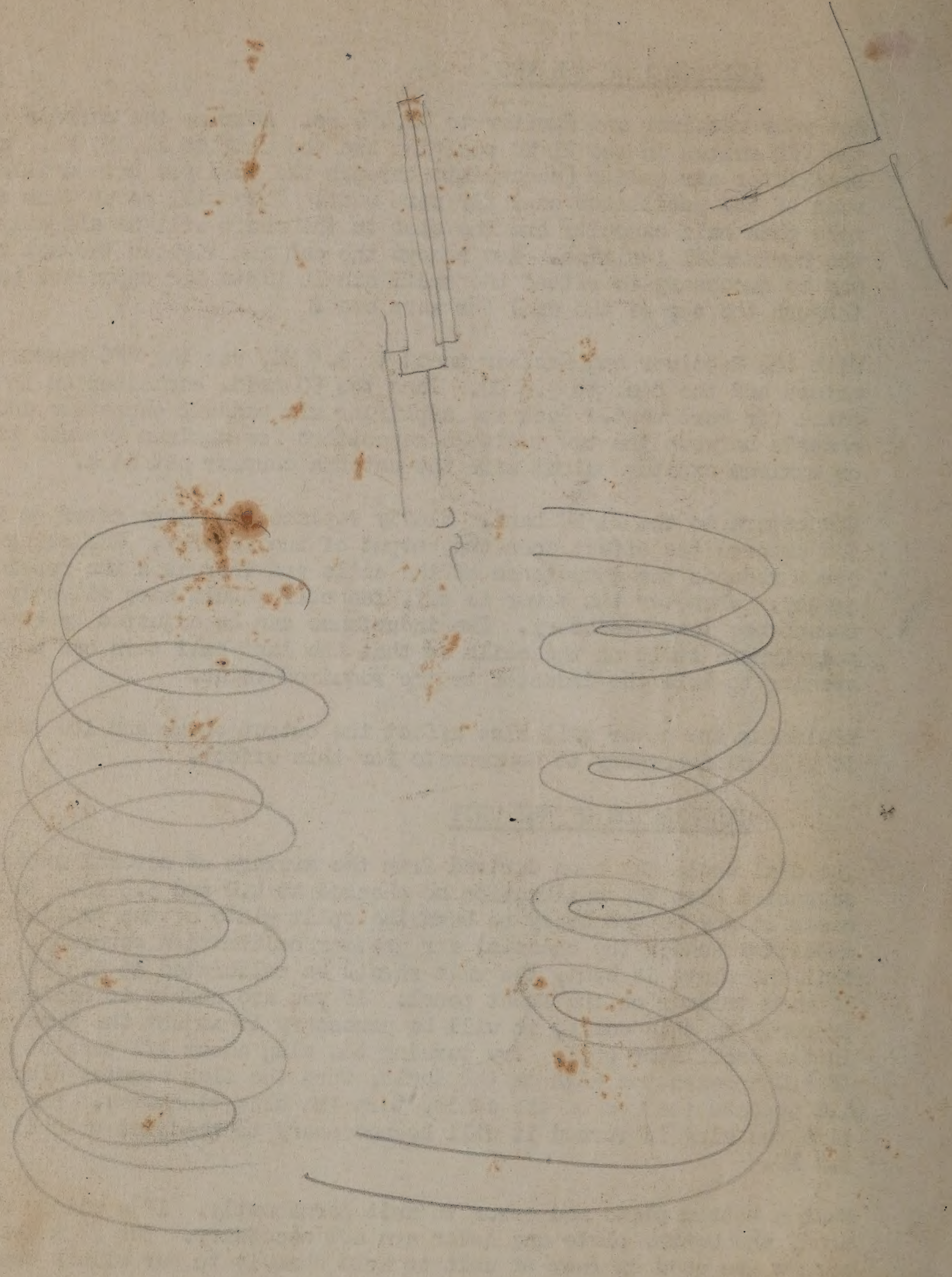
Replacing the cover will also affect the output on 40 and 160 meters, so it will be necessary to compensate for this effect.

CALIBRATION OF THE UNIT

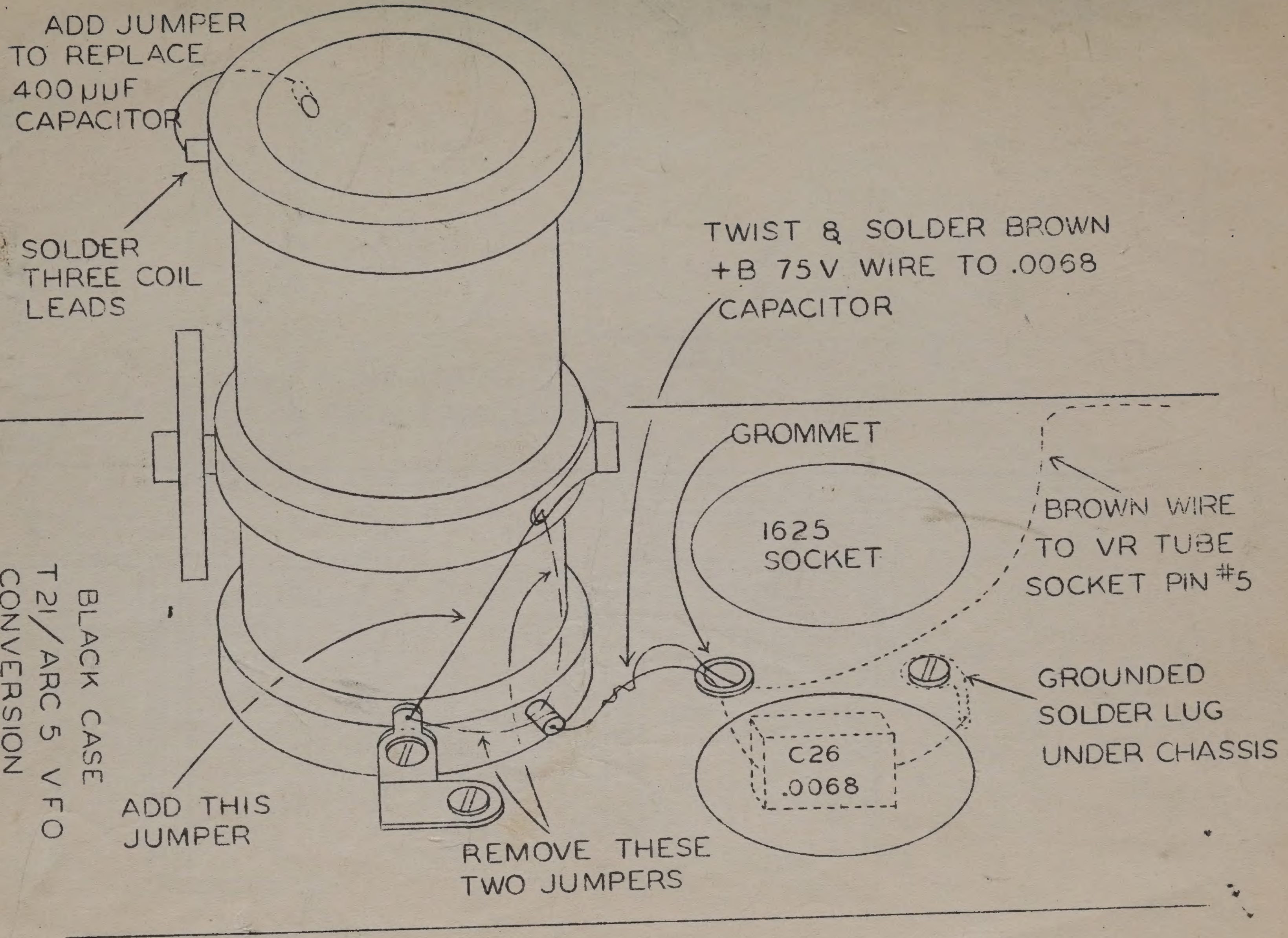
The dial scale has been derived from the average of several units. It is suggested that the calibration be checked at 4.0 and 3.5 MC. In some cases it may be necessary to bend the split plate of the oscillator tuning capacitor (under the chassis) for greater calibration accuracy. Each time that the plate is bent, the unit should be calibrated at 3.5 MC with the 50 mmfd trimmer on the front panel. If you are unable to calibrate 4.0 properly by this means, it will be necessary to adjust the iron core slug in the oscillator coil. Try turning the slug about 1/2 turn at a time. If 4.0 appears too high on the scale, turn the slug counter clockwise. If 4.0 appears too low on the scale, turn the slug clockwise. However, each time the slug is turned it will be necessary to readjust both 21 MC and 3.5 MC.

Fasten bottom plate and cover to unit permanently. If a slicer case is used, the bottom plate and cover are not necessary. Two #8 x 1-1/2" screws are used on rear of unit to hold chassis to our slicer case.

*The plates of the 50 mmfd. capacitor will be nearly fully meshed (maximum capacity) for zero beat. If they are not, you have selected the wrong signal at 21450 KC.



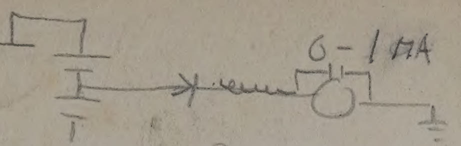
CENTRAL ELECTRONICS, INC.

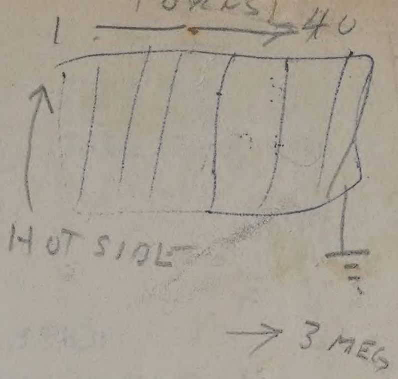

ADD JUMPER TO REPLACE 400 µµF CAPACITOR
SOLDER THREE COIL LEADS
TWIST & SOLDER BROWN +B 75V WIRE TO .0068 CAPACITOR
GROMMET
1625 SOCKET
BROWN WIRE TO VR TUBE SOCKET PIN #5
GROUNDED SOLDER LUG UNDER CHASSIS
C26 .0068
ADD THIS JUMPER
REMOVE THESE TWO JUMPERS

BLACK CASE
T21/ARC 5 VFO
CONVERSION

FIG. 7

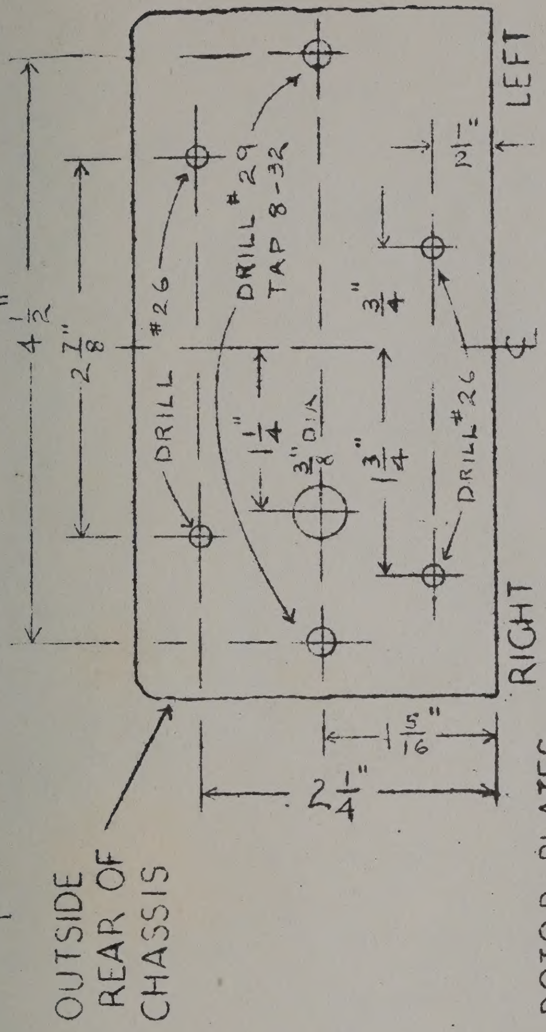
MV110
FOR 102MX & 103MX

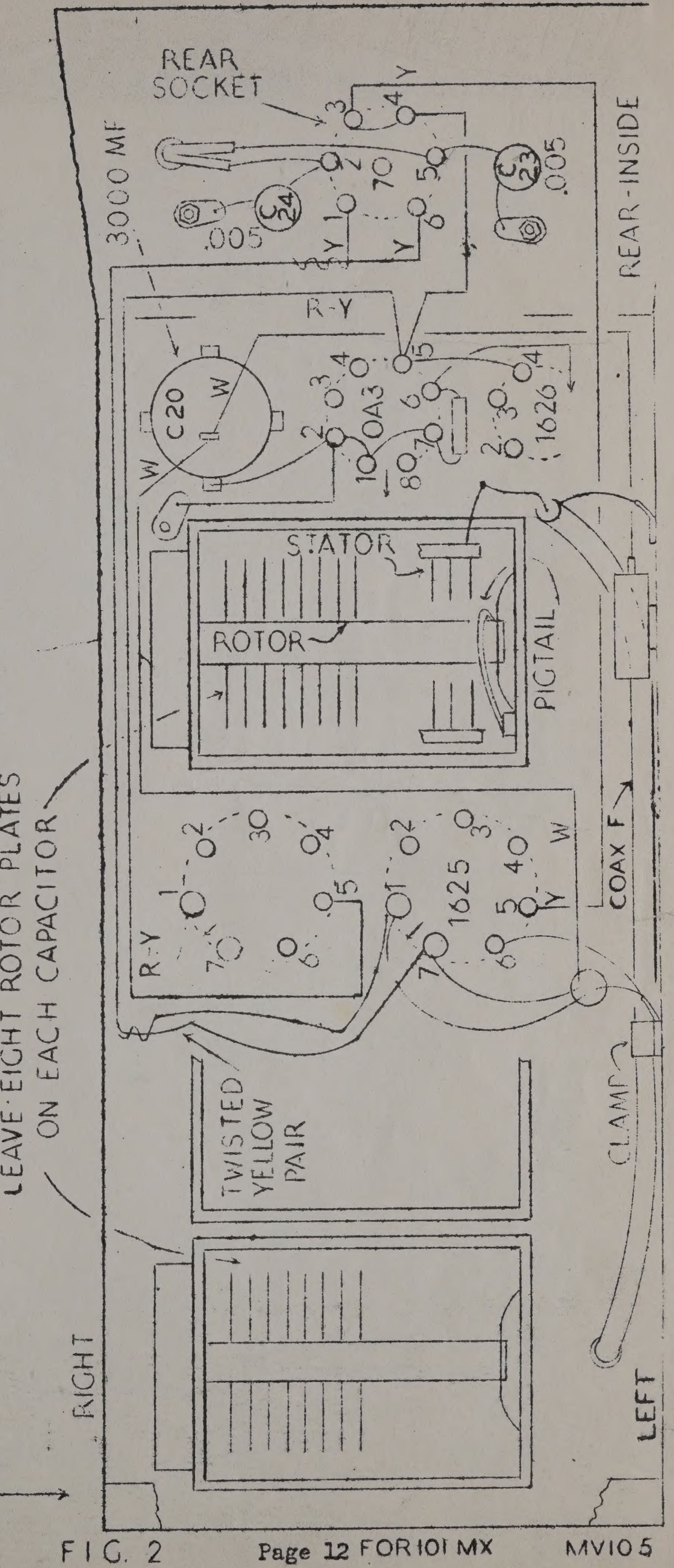



1
40
HOT SIDE
→ 3 MEG

	UNCONVERTED			CONVERTED.
	UNDERLOAD.	NO LOAD		
21.200	15 — 20.	10 20.2	10T	— .2
14.2	20 — 20.	20.2	13T	— 20.1
7.1	40 - 20.2	— 20.4	13T.	—
3.7	80 — 20.2	— 20.4	11T.	—

10 TURNS = 5.5 MEG.
11 TURNS. = 5.2 MEG.
13 TURNS = 5.0 MEG.


4 1/2"
2 7/8"
DRILL #26
DRILL #29
TAP 8-32
1 1/4"
3/8" DIA
1 3/4"
3/4"
DRILL #26
1/2
LEFT
RIGHT
1 5/16"
2 1/4"
OUTSIDE REAR OF CHASSIS


REAR SOCKET
3000 MF
C24
.005
C23
.005
REAR-INSIDE
R-Y
C20
W
OA3
1626
STATOR
ROTOR
PIGTAIL
1625
R-Y
W
COAX F
TWISTED YELLOW PAIR
CLAMP
RIGHT
LEFT
LEAVE EIGHT ROTOR PLATES ON EACH CAPACITOR

BOTTOM VIEW

6-3-54 458 Kit
Printed in U.S.A.
Rev. 11-4-54

FIG. 2

TERM. #1 TO 12 ON WAFER FARTHEST FROM PANEL

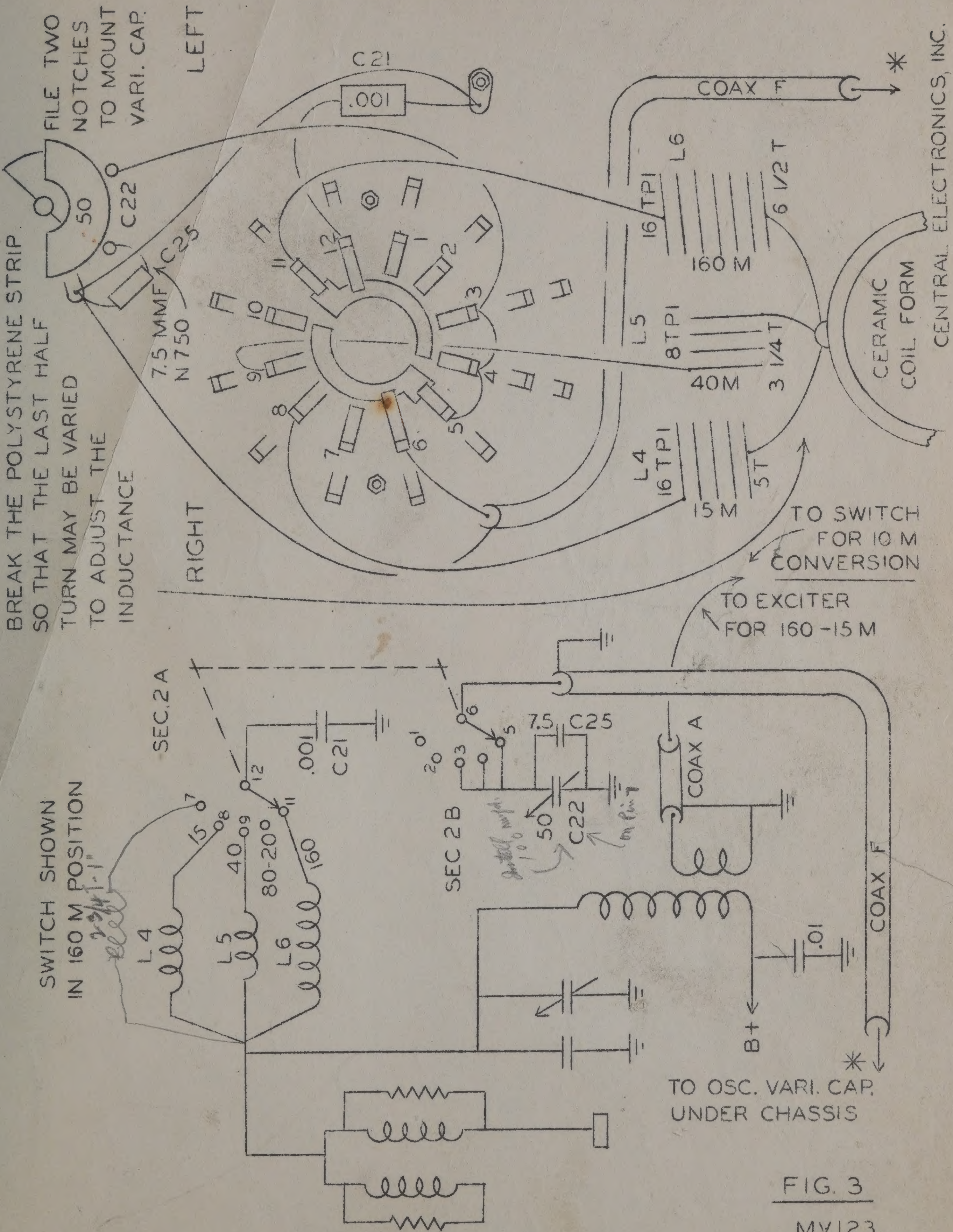
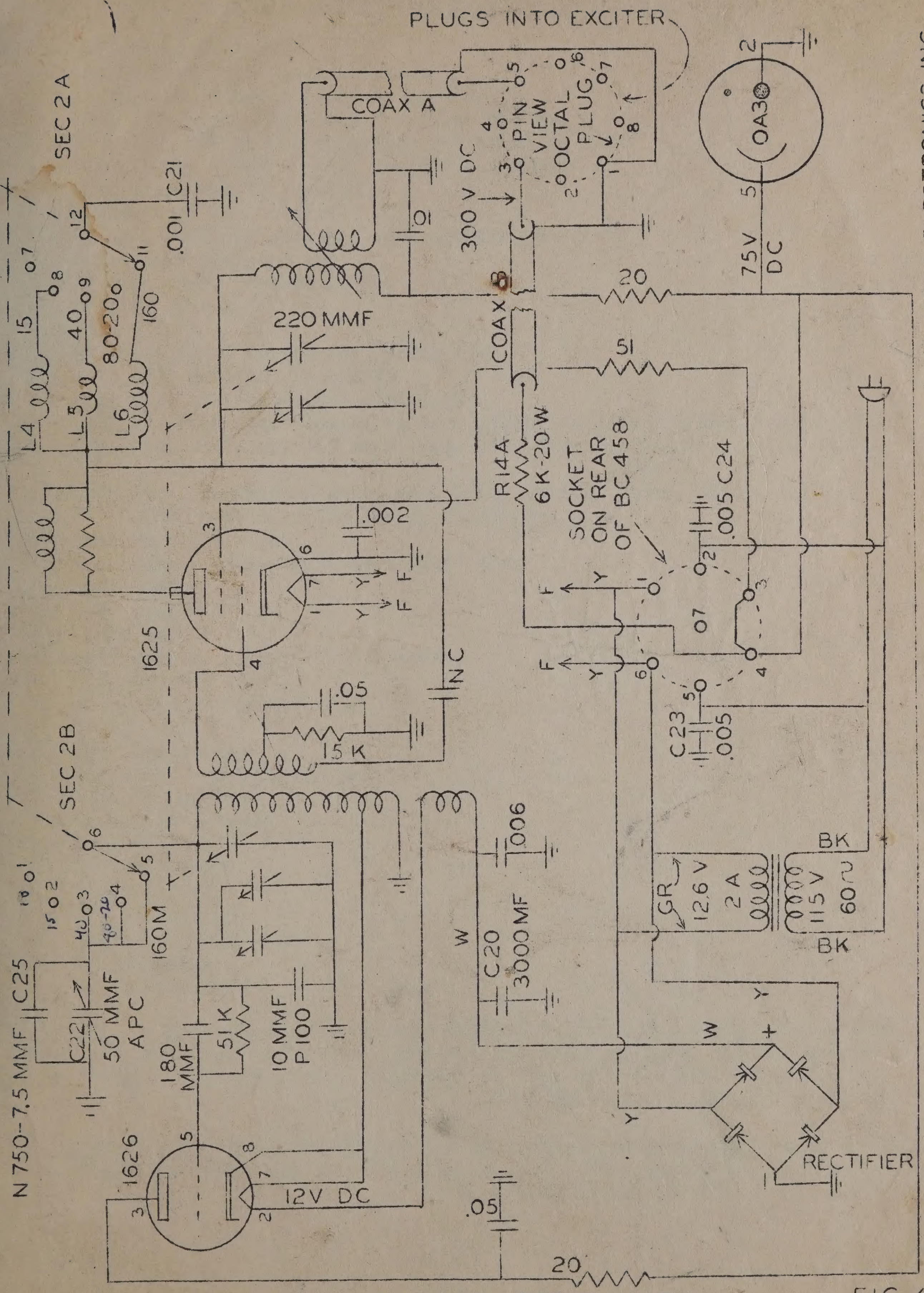

FILE TWO NOTCHES TO MOUNT VARI. CAP.
LEFT
RIGHT
C21
.001
COAX F
*
CENTRAL ELECTRONICS, INC.
CERAMIC COIL FORM
L6
16 TPI
6 1/2 T
160 M
L5
8TPI
3 1/4 T
40M
L4
16 TPI
5T
15 M
50
C22
C25
7.5 MMF
N 750
1
2
3
4
5
6
7
8
9
10
11
12
BREAK THE POLYSTYRENE STRIP SO THAT THE LAST HALF TURN MAY BE VARIED TO ADJUST THE INDUCTANCE
TO SWITCH FOR 10 M CONVERSION
TO EXCITER FOR 160 -15 M
SEC.2A
SEC 2B
.001
C21
7.5
C25
50
C22
Install 100 mmf
on Pin 1
COAX A
COAX F
SWITCH SHOWN IN 160 M POSITION
2 3/4 1-1"
15
40
80-20
160
L4
L5
L6
.01
B+
*
TO OSC. VARI. CAP. UNDER CHASSIS

FIG. 3

MV123
101 MX


PLUGS INTO EXCITER
COAX A
PIN VIEW OCTAL PLUG
300 V DC
.01
COAX B
220 MMF
SEC 2A
.001 C21
12
11
07
08
09
15
40
80-20
160
L4
L5
L6
1625
3
6
7
1
4
Y
F
.002
.05
15 K
NC
R14A
6 K-20 W
20
51
SOCKET ON REAR OF BC 458
.005 C24
C23 .005
OA3
75 V DC
2
5
SEC 2B
6
5
160M
C25
C22
N 750-7.5 MMF
50 MMF APC
180 MMF
51 K
10 MMF P100
.006
C20 3000 MF
W
GR
12.6 V 2 A
115 V 60~
BK
1626
8
12V DC
.05
RECTIFIER
+
20

SCHEMATIC OF CONVERTED UNIT

FIG 4

CENTRAL ELECTRONICS, INC.

5 TO 5.90

6.225 = 21450

MV124

101 MX

458 Kit - 7-1-55

Printed in USA

8070
6300
14370

9000
7193
1807

8070
3800
5270

8070
[illegible]
[illegible]
6725
1345
24 3410
[illegible]

458K - 5 BAND BC-458 CONVERSION KIT WITH BANDSPREAD DIAL

1 - Calibrated dial scale
1 - 0A3/VR75 voltage regulator tube
1 - 12 volt 2A filament transformer 27PF356
1 - Full wave bridge Selenium Rectifier 600 ma. 179604
1 - 3000 mfd. 12V filter capacitor and mounting plate
1 - Bandswitch, 4 pole 5 pos. and SPST, ceramic
1 - Bandswitch mounting plate
3 - Miniductors cut to size
1 - 20 watt 6000 ohm resistor with mounting brackets
1 - Octal male plug and cap
1 - 50 mmfd. var. capacitor, APC
1 - Bristo Wrench
4 - Rubber feet
4 - #6 sheet metal screws for rubber feet
2 - .005 mfd. ceramic capacitors
1 - .001 mfd. mica capacitor (10% tan)
1 - .006 or .0068 mica capacitor, tan. (Used on Navy T21/ARC5 version only)
1 - Capacitor, ceramic, 7.5 mmfd. neg. 750. (Purple, purple, green, white brown)
1 - Capacitor, ceramic 10 mmfd. pos. 100. (White, black, black, brown)
10 - Ft. RG58AU coaxial cable for RF and B plus
1 - Knob for bandswitch
2 - Transformer mounting spacers 7/16" long
1 - Line cord
2 - 3/8" grommets
3 - Cable clamps
6 - 4-40 screws, 4 nuts, 2 lockwashers
1 - #4 soldering lug
9 - #6 shakeproof ground lugs
2 - 3/8-32 nuts
1 - 3/8" lockwasher
1 - Rectifier mounting bracket
3 - 6/32-1" screws
5 - 6/32-5/16" screws
8 - 6/32 nuts
9 - #6 lockwashers
12" white wire
56" yellow wire
12" bare hookup wire
6" spaghetti
48" lacing cord

458-CP: An attractive gray wrinkle cabinet 5-1/2" wide, 8-3/4" high and 13" deep with silk screened front panel and all holes drilled; matches models 10 and 20 Multiphase Exciters. Identical in size with the Sideband Slicer.
PRICE..................$10.00

FOR TEN METERS: Model 458-10 crystal controlled converter package to extend the BC-458 for operation from 28.4 to 29.4 mc. Fits inside the BC-458 case.
Wired and tested $37.50 - Kit $27.50

DETAILED INSTRUCTIONS FOR BC-458 FIVE BAND CONVERSION KIT

I. Remove the cover and the bottom plate. Save the screws. Remove tubes.

In the following instructions the Right side of the chassis is the side with the frequency knob and the two worm gears. In order to avoid confusion while wiring, it is suggested that you mark the chassis Right and Left with pencil or crayon on the top, bottom and rear.

II. AT THE FRONT PANEL

✓1. Remove entire antenna loading coil assembly and mounting brackets. Remove the bakelite strip which holds the wiper contact for the antenna coil. Cut the bare wire which runs from the bakelite strip to the final tank coil. Discard.

✓2. Cut wires from the antenna grounding relay and remove wires from circuit. Remove relay and discard.

✓3. Remove the antenna binding post and insulators. With a small file, make two notches horizontally to hold the 50 mmf variable trimmer capacitor. Mount the trimmer with two #4-40 screws and lockwashers.

✓4. Remove calibrated window and discard.

✓5. Remove large hex nut and dial. Save hex nut.

III. ON THE REAR OF CHASSIS (OUTSIDE) See Fig. 2.

✓1. Drill 4 holes with #26 drill as shown. These are for filament transformer and 6K-20 watt resistor.

✓2. Drill a 3/8" hole as shown, for grommet. Place grommet in hole.

✓IV. CHASSIS BOTTOM PLATE

✓1. Drill four #33 holes about 1" in from each corner and mount the rubber feet with #6 self-tapping screws.

V. AT THE EYE TUBE SOCKET (VT138-1629) ON THE RIGHT OF THE CHASSIS

✓1. Remove the two white leads from the wire wound resistor to pins #2 and #7 of the socket.

✓2. Remove the wire wound resistor and twist off the brackets.

✓3. Carefully remove the remaining white wire from pin #7. This lead will later connect to the 3000 mfd. filter capacitor. Remove the resistors and the rest of the leads and the socket. Discard. Remove the red lead that goes to the 1626 socket pin #3. Now remove the other red wire to the 3 - .05 mfd. capacitor center pin. Discard both leads.

VI. ON TOP OF THE CHASSIS

✓1. It will be necessary to cut a portion of the oscillator shield can lip at the right rear corner so that it will clear the 3000 mfd. filter capacitor. (See Fig. 1) Temporarily place the 3000 mfd. capacitor in the empty socket hole and mark the place where the capacitor extends over the lip of the shield with a pencil. Now

remove the oscillator shield can and cut this portion away.

✓2. Drill a 3/8" hole about 3/4" directly below the present 1/2" hole in the side of the can so that the rotor of the oscillator padding capacitor will be accessible.

✓3. Loosen the two Bristol head screws that hold the oscillator padding capacitor shaft.

✓4. Set the single plate trimmer on the top of the oscillator capacitor for half capacity.

✓5. If you intend to use the regular BC-458 case, the little 3 mmfd. neg. temperature coefficient capacitor on top of the fixed oscillator padding capacitor should be removed and replaced with the 10 mmfd. pos. 100 capacitor furnished with the kit. SEE FIG. 6.

If the DeLuxe case and panel are used, remove the 3 mmfd. capacitor, but OMIT the 10 mmfd. pos. 100.

✓6. Drill two holes and mount the filter capacitor plate under the socket previously used for the eye tube (1629).

✓7. Replace the oscillator shield can temporarily with two screws on each side. Mount the 3000 mfd. capacitor in the plate.

✓8. On the left side of the chassis about 1-1/2" behind the front panel, there is a threaded bushing that formerly held the bakelite strip. Drill this out with a 1/4" drill and enlarge to 3/8". Co-ax cable passes through this hole later on.

✓9. On left side of chassis, 5" behind front panel and 5/8" from left edge of chassis, a 3/8" diameter hole is to be drilled for a grommet. Place grommet in hole. Filament wires will pass through this grommet.

IF YOUR UNIT IS THE T-21 ARC5, (NAVY VERSION WITH RF CHOKE) SEE MANUAL #102MX BEFORE YOU CONTINUE.

✓10. Mount Selenium rectifier bracket on left side of chassis with foot towards gear on coil, as follows: remove one screw from small gear support bracket and substitute a longer screw for it; one you have removed elsewhere. Fasten rectifier bracket on top of gear bracket with longer screw.

✓11. Mount rectifier to bracket with a 1" #6 screw, lockwasher and nut. Have head of screw toward left side. Have rectifier terminals toward rear of chassis.

VII. AT THE RELAY UNDERNEATH THE CHASSIS

✓1. Cut black and tan leads from relay coil and remove from circuit.

✓2. Cut the two red leads from the relay contacts and remove from circuit.

✓3. Cut the bare wire at the relay that goes to the 1625 socket Pin #6.

✓4. Remove and discard the relay. Enlarge the hole which formerly held the relay and mount a soldering lug and ground clamp with #6 hardware.

✓5. Solder bare wire from 1625 socket pin #6 to the solder lug.

VIII. UNDERNEATH THE CHASSIS

1. Open the tuning capacitor by turning the frequency control counter-clockwise as far as it will go. It is necessary to remove the rotor plates from each of the two tuning capacitors until eight rotors remain in each one. Remove those plates farthest from the worm drive as shown in Fig. 2. CAUTION: DO NOT REMOVE THE SLOTTED PLATE. To remove the plates, gently rock the rotor plates with a long nose pliers, one at a time, until they become loose. If too much force is used, the rotor may become dislodged and the small ball bearings will fall out. Care should also be taken not to exert any pressure on the stator sections as this can cause the glass insulating beads to fall out.
2. At the rear variable capacitor a pigtail should be installed. See Fig. 2. Solder one end to rotor shaft and other end to rivet which holds rotor spring.
3. The end stator plate may be bent slightly toward right to give the pigtail more clearance.

Paragraphs IX and IXB should be done ONLY if our DeLuxe Case and Panel are to be used. Otherwise ignore instructions relating thereto.

IX.

Do not remove the panel.
If the rectangular bandswitch plate has been used on a converted unit it must be removed from panel.
If the 50 mmf variable capacitor has been used on a converted unit it must be removed from front panel.

The new panel has been designed from the average of many units and matches the front panel holes of most BC-458s. It may be necessary to enlarge four #6 screw holes on your old front panel for best alignment of all holes.

1. Remove frequency chart plate and rivets.
2. Remove two studs which held calibrated window.
3. Remove antenna coupling knob and save. Use Bristo Wrench.
4. Remove frequency control knob and save. Use Bristo Wrench.
*5. To remove antenna coupler "lock" knob on left side of panel, crush plastic knob with pliers and pull pin out of knurled collar. Remove collar and locking cam.
*6. Antenna inductance locking knob is removed same as No. 10.
7. Remove rivet holding antenna inductance lock spring.
*8. Frequency lock knob is crushed with pliers and pin removed from knurled collar. Remove collar from shaft. The 3/16" shaft is grasped with pliers and pulled away from front of panel. A saw is now used to cut off shaft very close to outside of panel.
9. Cam is pushed out through rear side of panel.
10. Break away black metal ring which is under dial. Drill out rivets with a 1/8" drill. Do not damage gear inside panel.

11. Remove all burrs and high spots from outside of front panel with a file or sandpaper.
12. Remove two pointed head screws at bottom of panel.
13. Two holes, about 1-5/8" below top of panel are to be enlarged for #6 screws with a #26 drill. Hold the new panel over the old one for exact location of holes. Also mark old panel for drilling holes where dial pointer screws will need clearance.
14. The new panel is mounted over the present panel with four #6 screws, washers and nuts.
15. At the holes you enlarged, a solder lug is placed under nut on left side, as shown in Fig. 3.
16. A special washer is supplied for use underneath the new dial when necessary.
17. Mount ceramic wafer switch (have supporting screws in a horizontal line) with backing nut, lockwasher and nut.
18. Mount knob on switch shaft. Fasten two black plastic knobs to "Frequency" and "Antenna Coupling" shafts.
19. Turn the antenna coupler shaft counterclockwise, all the way. Fasten the knob to shaft with arrow pointing at 7:00 o'clock.
20. Mount 50 mmf capacitor with two #4 screws and lock washers through holes in new panel and through slots in old panel.

*Some BC-458s have locking knobs fastened with a set screw which can be removed with a Bristo Wrench. On other units a pin is used to hold knob and can sometimes be removed. As a last alternative the knob may be crushed with pliers.

IXB. AT REAR OF CHASSIS

1. Drill two #29 holes 4-1/2" on centers. See Fig. 2
2. Tap for #8-32 screws. These are to fasten case to chassis.

X. AT THE VR75 SOCKET (FORMERLY CRYSTAL SOCKET)

1. Remove resistor between pin #3 and #8. Discard.
2. Remove black lead from pin #3 and discard.
3. Unsolder end of resistor from pin #5.
4. Unsolder two black leads from pin #5
5. Disconnect black wire from pin #5 on rear socket and discard.
6. Reconnect remaining black wire from pin #5 and end of resistor (see Step 3) to pin #6.
7. Add a jumper between pin #1 and #2.
8. At the 1626 socket, remove red lead from pin #4 and take out of circuit.
9. Solder a jumper from 1626 socket pin #4 to VR tube socket pin #5.

XI. AT THE 7 PIN SOCKET ON THE REAR OF THE CHASSIS (Inside)

Pin #7 is center pin. Pin #1 is toward top of chassis on right side. Pin numbers run clockwise.

✓ 1. Remove the white lead from pin #1 and discard.
✓ 2. Remove red lead from pin #4 and remove from circuit.
✓ 3. Remove two black leads from pin #2 and discard.
✓ 4. Remove black lead from rear socket pin #6 and VR socket pin #7, and discard.
✓ 5. Remove red-white lead from rear socket pin #7 and attack to VR socket pin #5.
✓ 6. Solder a jumper from VR socket pin #5 to rear socket pin #4.
✓ 7. On rear socket, solder a jumper from pin #3 to pin #4.

XII. AT THE 1625 SOCKETS (See Fig. 2)

✓ 1. Remove the filament leads from pin #1 and pin #7 of each tube and remove from circuit.
✓ 2. Remove the 51,000 ohm resistor from the left 1625 socket on pin #6 and pin #7 and discard.
✓ 3. Take two 18" lengths of yellow wire and twist together.
✓ 4. Solder one yellow wire to the left 1625 socket pin #1 and the other yellow wire to pin #7.
✓ 5. Run the twisted yellow pair along the right side of the chassis back to the 7 pin socket on the rear of the chassis. Solder one yellow lead to pin #1 and the other to pin #6 of the 7 pin socket on the rear of the chassis.
✓ 6. Take two yellow wires, each 9" long, and twist together. Push twisted pair through grommet to Selenium rectifier. Solder one wire of twisted pair to yellow dotted terminal lug of rectifier. Solder the other yellow wire to other yellow dotted terminal lug.
✓ 7. At the left 1625 socket: solder one yellow wire to pin #7 and the other yellow wire to pin #1.
✓ 8. Solder a jumper to rectifier negative (black dotted lug) and push other end through grommet and solder to ground lug at cable clamp.
✓ 9. Solder a white wire to red dotted (positive) rectifier lug and push other end through grommet and run to 3000 mf capacitor. Attach end of white wire to center terminal of capacitor.
✓ 10. Solder the white wire which you removed from pin #7 of the socket to the center (positive) terminal of the 3000 mfd. filter capacitor.
✓ 11. Add a jumper from the ground tab of the 3000 mfd. filter capacitor to pin #2 of the VR tube socket.

XIII. AT THE FRONT PANEL (Refer to Fig. 3)

✓ 1. Mount the rectangular bandswitch plate on the outside of the panel with the lettering facing the outside, with #4-40 screws. Use a soldering lug under the upper nut on the left side. (Do not mount this plate if a DeLuxe Case and Panel are used.)
✓ 2. Mount the bandswitch with a backing nut and lockwasher on the inside of the panel and a nut on the outside. The two nuts on the frame of the switch should be in a horizontal line.
✓ 3. The bandswitch has two wafers; the one nearest the front panel is not used for this conversion. The wafer farthest from panel numbered 1 to 12 (See Fig. 3) should be used.
✓ 4. Add a 7.5 mmfd neg. 750 temperature compensating capacitor across the rotor and stator terminals of the 50 mmfd APC capacitor. (See Fig. 6)

5. On the switch, run a jumper from term. #5 to term. #4 to term. #3 to stator of the 50 mmf variable capacitor. (See Fig. 3)
6. Add a jumper from the rotor lug of the 50 mmf variable capacitor to the left ground lug.
7. Prepare a piece of coaxial cable 16" long.
8. Push the coaxial cable through the 3/8" hole which has been drilled on the left side of chassis.
9. Solder inner conductor of the coax to term. #6 of the bandswitch and the outer shield to rotor lug of the 50 mmf variable capacitor.
10. Solder the other end of the coax center conductor to the stator of the oscillator tuning capacitor at the rear of the chassis just above the 1626 socket. The cable clamp at the former relay position is used to hold the coax to the side of chassis.
11. Solder the outer shield of the coax to the ground lug at the mica capacitor on the side of chassis. Be sure that ground lug under nut holding mica capacitor is tight.
12. Cut off the right side 1625 plate connector.

XIV. INSTALLING THE THREE INDUCTORS (See Fig. 1 and Fig. 3)

NOTE: If you intend to install the 10 meter converter at this time, do not mount these miniductors until you have installed the converter.

1. Solder one end of a 5 turn 16TPI miniductor to term. #8 on the switch and the other end to the top lug of the ceramic coil form.
2. Solder one end of a 3-1/4 turn 8TPI miniductor to term. #9 on the switch and the other end to the top lug of the ceramic coil form.
3. Solder one end of a 6-1/2 turn 16TPI miniductor to term. #11 on the switch and the other end to the top lug of the ceramic coil form.
4. Break the polystyrene strip so that the last half turn of each coil may be varied to adjust the inductance.
5. Solder a .001 mf mica capacitor from switch terminal #12 to the left ground lug.

XV. MOUNTING THE FILAMENT TRANSFORMER (See Fig. 1)

1. Mount the transformer on the rear of the chassis with 1/2" spacers with the secondary (green) leads down. Place a soldering lug on the inside of the chassis under each nut. There should be a cable clamp on the outside of the chassis under the right spacer.

2. Trim the secondary leads (green) to proper length and solder into rear socket pins #1 and #6 from the outside.
3. Trim primary leads (black) to proper length and solder into rear socket pins #2 and #5 from the outside.
4. Mount the 6000 ohm 20 watt resistor as shown, with a soldering lug under the right bracket screw head and a cable clamp under left bracket.

XV. MOUNTING THE FILAMENT TRANSFORMER (Continued)

✓5. Solder an insulated jumper from pin #4 of the rear socket to the left soldering tab of the 6000 ohm 20 watt resistor (outside of chassis).
✓6. Push about five inches of the line cord through the grommet on the right side of the chassis; tie a knot in it.
✓7. Solder one lead of the line cord to rear socket pin #2 and the other lead to pin #5 (inside of chassis).
8. Solder a .005 mfd. ceramic capacitor from the rear socket pin #2 to the right ground lug. Keep the leads as short as possible.
✓9. Solder a .005 mfd. ceramic capacitor from the rear socket pin #5 to the left ground lug. Keep the leads as short as possible.

✓NOTE: If the VFO is to be operated in TV fringe areas, it may be advisable to insert the AC line leads outside and to by-pass rear socket pins #1, #6 and #4 on the inside of the chassis with ceramic capacitors.

XVI. ATTACHING THE B PLUS AND RF CABLES (See Fig. 1 and 4)

✓1. Prepare one end of a piece of coax cable 3 feet long. Solder the center conductor to pin #3 of the octal male plug.
✓2. Solder the outer shield of the coax to pin #1 of the octal male plug. (This is the coax which carries the B plus. Coax "B")

NOTE: If you intend to make the 10 meter conversion in the immediate future, make coax "A" 4 feet 5 inches long. In the 10 meter conversion, coax "A" goes to the bandswitch instead of the variable link, as described in Step 10.

✓3. Prepare one end of a piece of coax cable 4' 2" long. Solder the center conductor to pin #5 of the octal male plug. (This is coax "A")
✓4. Solder the outer shield to pin #1 of the octal male plug.
✓5. Slip plug cover over the cable and snap on to the plug.
6. Tie or lace the cable to within about 4" of end of coax cable "B".
✓7. Prepare the end of the coax cable "B" and place under left cable clamp and tighten. Solder the center conductor to the right tab of the 6000 ohm resistor and the outer shield to the ground lug at the resistor.
8. Cut about 1/2" of the outer black vinyl insulation from the cable, as shown in Fig. 1. Now fill the groove with a winding of bare wire and place under the cable clamp and tighten. Grounding the cable at this point will help reduce the radiation of harmonics and also help prevent the transmitter output from being introduced back into the VFO.
9. Run coax "A" over the 3000 mf capacitor and then over the oscillator shield to the ceramic PA output coil.
10. Prepare the end of the coax cable "A" and solder the center conductor to the output of the variable link which is the lug next to the large bakelite gear. Solder the coax outer shield to the ground lug on the left side of the PA coil base.

XVII. ATTACHING THE DIAL

1. Replace black metal dial as it was originally and turn the dial completely clockwise until the indicator coincides with the small white line located about 1/2" to the left of the 5.3 MC calibration. Remove the nut, the dial and the two small pins. Put on the plastic dial so that the small black line located about 1/2" to the left of the 4 MC calibration coincides with the indicator line and tighten the nut. CAUTION: The dial nut on some units is made of plastic material. Do not use too much force when tightening this plastic nut.

XVIII. ALIGNMENT OF THE VFO

Set your receiver and Exciter to 21,450 kc. Advance the carrier knob. With the VFO switch in the 21 MC position and the dial at 21,450 kc., adjust the oscillator air padder (accessible through the hole you have drilled in the side of the oscillator can) for zero beat. This will occur with a little more than half capacity and the slot in the shaft will be slightly beyond the horizontal position. Now remove the can and tighten the set screws. It may be necessary to retune the small single plate air capacitor (accessible through the top of the can) for zero beat.

With the Receiver and Exciter tuned to 3.5 MC, set the VFO bandswitch to 80 meters and the dial to 3.5 MC. Tune the 50 mmfd. capacitor on the front panel for zero beat. The plates of the 50 mmfd. capacitor will be about 75% meshed (maximum capacity) for zero beat. If they are not, you have selected the wrong signal at 21450 KC. Peak the amplifier air padding capacitor under the chassis between the two variable capacitors for maximum VR tube brilliance or maximum Exciter output with the antenna coupler set at 4.

Now return to the 21 MC band. Slowly replace the large cover on the BC-458 and observe the effect upon the output of the Exciter. Replacing this cover reduces the inductance of the coils and increases the resonant frequency. Whenever the cover is off, the coil should have slightly more inductance than necessary. The inductance can be adjusted by breaking the polystyrene strip on the coils so that the last half turn can be varied in spacing to trim the inductor to the required value.

Replacing the cover will also affect the output on 40 and 160 meters, so it will be necessary to compensate for this effect.

XIX. CALIBRATION OF THE UNIT

The dial scale has been derived from the average of several units. It is suggested that the calibration be checked at 4.0 and 3.5 MC. In some cases it may be necessary to bend the split plate of the oscillator tuning capacitor (under the chassis) for greater calibration accuracy. Each time that the plate is bent, the unit should be calibrated at 3.5 MC with the 50 mmfd trimmer on the front panel. If you are unable to calibrate

4.0 properly by this means, it will be necessary to adjust the iron core slug in the oscillator coil. Try turning the slug about 1/2 turn at a time. If 4.0 appears too high on the scale, turn the slug counter clockwise. If 4.0 appears too low on the scale, turn the slug clockwise. However, each time the slug is turned it will be necessary to readjust both 21 MC and 3.5 MC.

XX. Fasten bottom plate and cover to unit permanently. If a Slicer case is used, the bottom plate and cover are not necessary. Two #8 x 1-1/2" screws are used on rear of unit to hold chassis to our DeLuxe Case.

When the 1625 is operating as a tripler stage to 16 mc., for 40 meter operation, it is important that the tube have full emission. If the 1625 in your unit has had considerable use, or if you cannot secure full 40 meter output after operating the unit for six months or a year, replace the tube.

XXI. EXACT CALIBRATION OF UNIT

The 50 mmfd. APC capacitor on the front panel should be used to set the calibration on 160, 80, 40, 20 and 10 meters. The 15 meter band should be calibrated by means of the single plate capacitor accessible through the hole in the top of the oscillator shield can.

A.C properly by this means, it will be necessary to adjust the iron core slug in the oscillator coil. Try turning the slug about 1/2 turn at a time. If A.C appears too high on the scale, turn the slug counter clockwise. If A.C appears too low on the scale, turn the slug clockwise. However, each time the slug is turned it will be necessary to recheck both 71 KC and 3.5 MC.

IX. Fasten bottom plate and cover to unit permanently. If a Heathkit cabinet is used, the bottom plate and cover are not necessary. The #6 x 1-1/2" screws are used in back of unit to hold chassis to the Deluxe Case.

When the 1629 is operating as a tripler (?) to 11 mcs, for A.C meter operation, it is important that the tube have full emission. If the 1629 in your unit has had considerable use, or if you cannot secure full A.C meter output after operating the unit for six months or more, replace the tube.

XII. USE OF CALIBRATION CHART

The 50 mmfd. [illegible] capacitor on the front panel should be used to set the calibration at 160, 80, 40, 20 and 15 meters. The 15 meter band should be calibrated by means of the single plate capacitor accessible through a hole in the top of the oscillator shield can.

MV103
FOR 101 MX

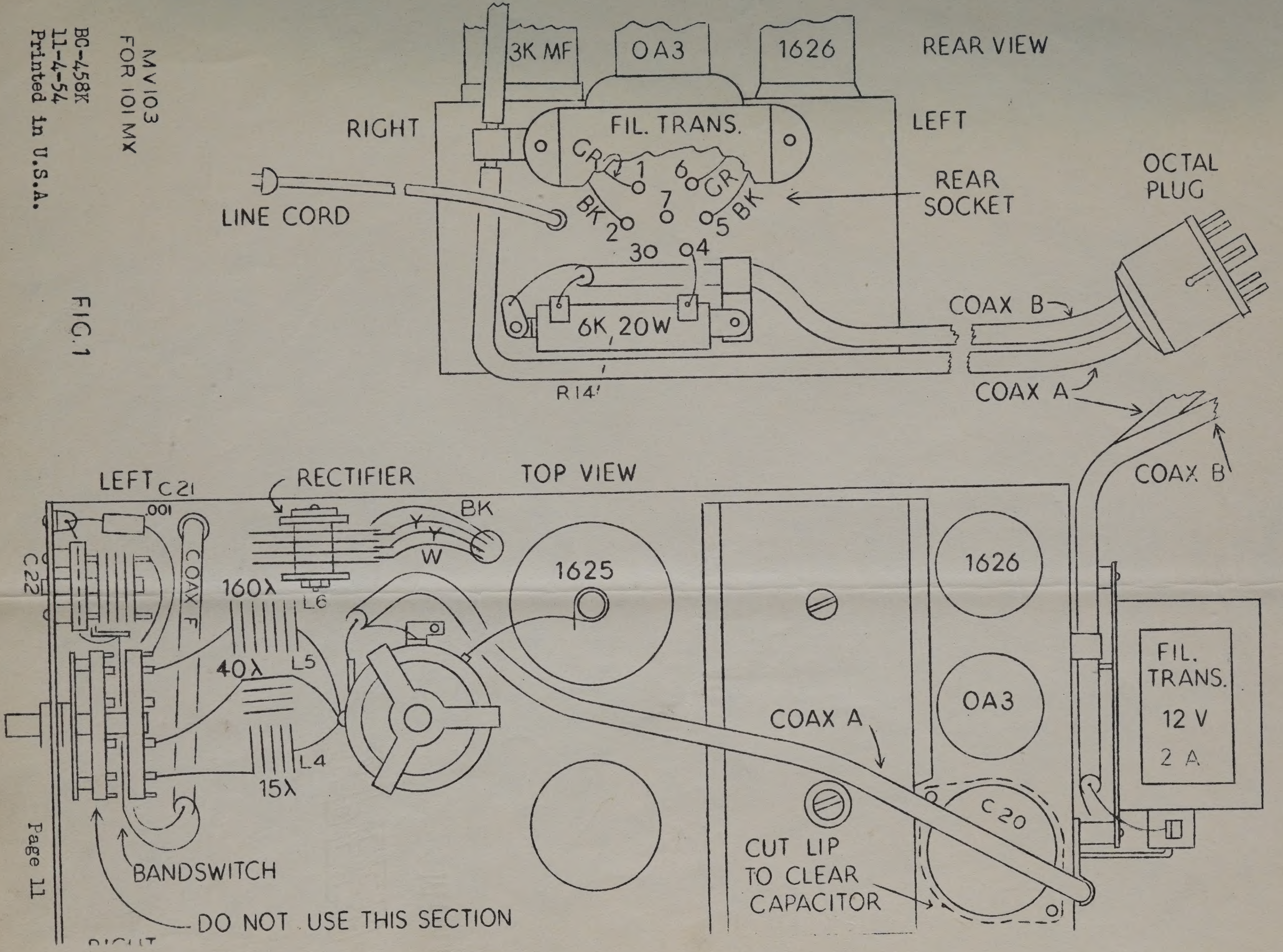

REAR VIEW
3K MF
OA3
1626
RIGHT
LEFT
FIL. TRANS.
GR
1
6
GR
BK
2
7
5
BK
3
4
REAR SOCKET
OCTAL PLUG
LINE CORD
6K, 20W
R14'
COAX B
COAX A
COAX B
TOP VIEW
LEFT
C21
.001
RECTIFIER
BK
W
C22
COAX F
160λ
L6
1625
1626
40λ
L5
L4
15λ
OA3
COAX A
FIL. TRANS. 12 V 2 A
C20
CUT LIP TO CLEAR CAPACITOR
BANDSWITCH
DO NOT USE THIS SECTION

FIG.1

BC-458K
11-4-54
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